

CANADIAN MACHINERY

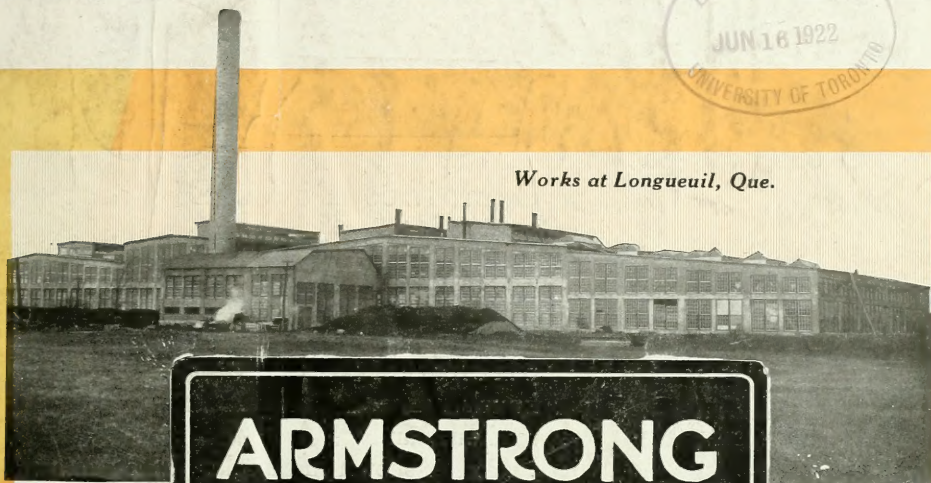
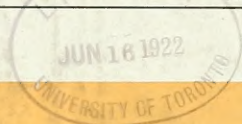
AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied field. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVIII—No. 6

Publication Office: Toronto, August 9, 1917

Subscription Price
\$3.00 per Year



Works at Longueuil, Que.

**ARMSTRONG
WHITWORTH**
of CANADA Limited

Manufacturers of

**High Speed and Carbon Tool Steel
Miscellaneous Shop Tools,
Gauges, Etc.**

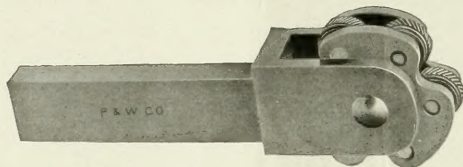


298-300 St. James St.,
MONTREAL, P.Q.
Dominion Bank Building,
TORONTO, ONT.

27 King William St.,
HAMILTON, ONT.
McArthur Building,
WINNIPEG, MAN.

SMALL TOOLS

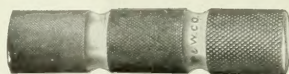
P. & W. Combination Lathe Knurling Tool



Combines Three Distinct Knurling Tools in One

You will save time by using this three-in-one Lathe Knurling Tool.

It carries three
itches of
knurls, fine,
medium and



coarse, as shown in sample. This does away with necessity of having three holders or of changing knurls where but one holder is available. Same knurls can be used in this holder as are used in our regular Lathe Knurling Tool.



Regular Lathe Knurling Tool

Precision Machine Tools — Standards & Gauges

PRATT & WHITNEY CO.

of Canada, Limited

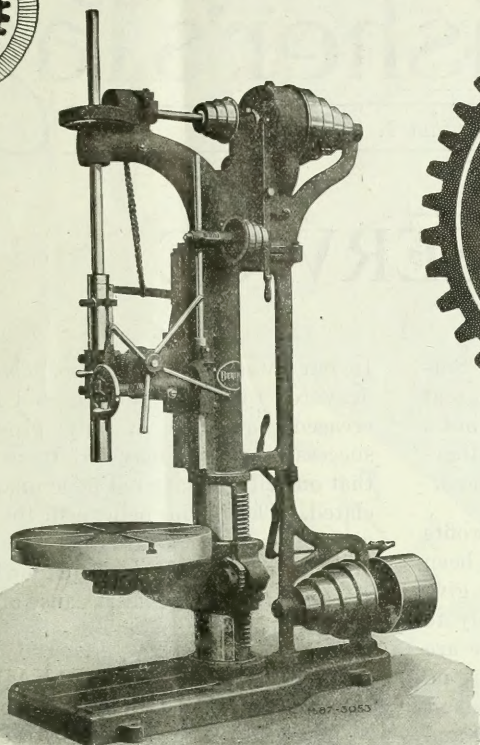
Works: DUNDAS, ONTARIO

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.



**Locomotive and
Car Shop Equipment**

**Structural and
Bridge
Shop Machinery**

**Repair Shop
Machinery**

**General Machine
Shop Equipment**

**30-Inch Vertical
Drilling Machine**

Photographs and full particulars gladly
mailed upon request.

WRITE US NOW

We'll be pleased to submit
photographs and full details
on any line or lines in which
you are interested.

**The John Bertram & Sons Company
Limited**

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.



If any advertisement interests you, tear it out now and place with letters to be answered.

The Publisher's Page

TORONTOAugust 9, 1917

ON SERVICE

SERVICE to some means little. Service to others implies a very great deal — everything. To some it is but a glittering cornice-piece, while to others it is the very foundation of business.


It has been truly said that he profits most who serves best. And it has been said, too, that it is more blessed to give than to receive. We are all ready to serve—to a certain extent, and we are all willing to give—to a point where no immediate discomfort or embarrassment is caused. But to serve to the limit and to give till it hurts! That's different.

There is an advertiser in CANADIAN MACHINERY, the burden of whose message is "Service" week in and week out—Service, Service, Service. To the uninitiated this constant repetition will not possess the significance it holds for customers who have put our advertiser to the test when real service was needed. The story of service rendered by this very large firm, if it could be told, would open the eyes of some of us, we feel sure, and would give us an idea of what genuine sacrificial service really is. And if the story could be told it would be shown that service really pays and pays big, and that it not only pays once, but **continually**.

In our humble way we, too, have endeavored to render service, and if increased patronage is any proof of success, then we may safely assume that our efforts have not gone unappreciated. Those who believe in the religion of service are usually those who are first to recognize and acknowledge a service rendered, and, because of this, we are glad.

In an effort to make CANADIAN MACHINERY of still greater service we have added to our market section letters from our own correspondents in New York and Pittsburg. We were able, fortunately, to secure the services of men whose records are of the very best, men of long experience in market work, well connected men who have and are still doing market work for some of the top notch American journals and newspapers. Our weekly letters from New York and Pittsburg can therefore be regarded as authoritative and right up to the minute.

This new feature of CANADIAN MACHINERY is but a small part of the service we give, and even smaller fraction of the service we would like to render. We are still young. Let us live in hope.



Quality

**STEEL & IRON
PRODUCTS
OF
EVERY DESCRIPTION**

Service

**THE
STEEL COMPANY
OF
CANADA**

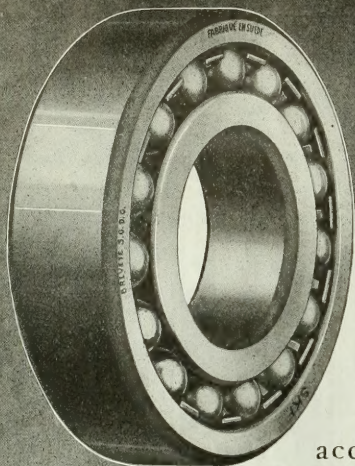
HAMILTON

LIMITED

MONTREAL

The central white cloud shape contains various illustrations of steel products, including bolts, nuts, washers, rivets, pipes, and structural beams. The background shows a large industrial building with workers and machinery, including a crane lifting a large object.

If any advertisement interests you, tear it out now and place with letters to be answered.



SKF

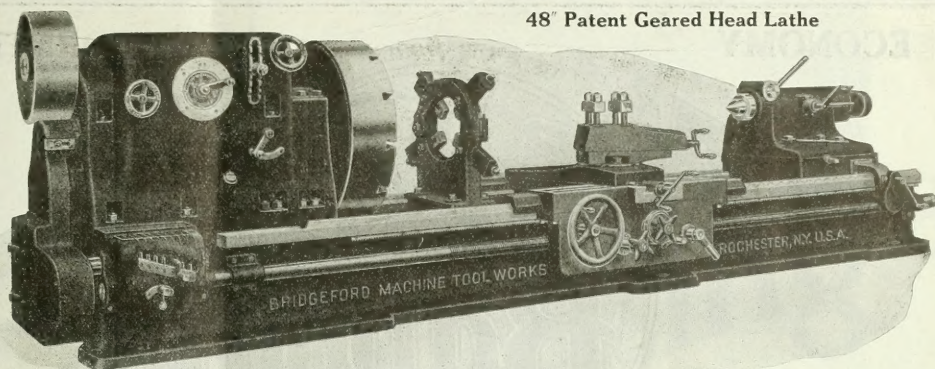
Accuracy

No machine can produce work more accurate than its bearings. Some bearings are accurate to 1/100 of an inch. Others are accurate to 1/1000 of an inch. But S K F are accurate to 1/10,000 of an inch.

It is clear that S K F Ball Bearings will permit a machine to turn out work of the very highest accuracy. This is what makers desire and users demand. Write us for more information. A thorough investigation will repay you.

CANADIAN SKF
COMPANY, LIMITED
TORONTO, CANADA





48' Patent Geared Head Lathe

The Bridgeford for Big Work

That's what this powerful Bridgeford is built for—big work. Has strength and rigidity sufficient to perform the heaviest kind of jobs with perfect accuracy—and it goes through them in record time. Smooth in action. Strongly constructed. Fifteen cutting speeds all easily changed.

Bridgeford's Lathes give maximum production at minimum cost. We'll be glad to give you a full account of what they will do. Write

Bridgeford Machine Tool Works, Rochester, N.Y.
161 WINTON ROAD

Double-Quick Cutting-Off

THE HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE has the advantage of two cutting tools.

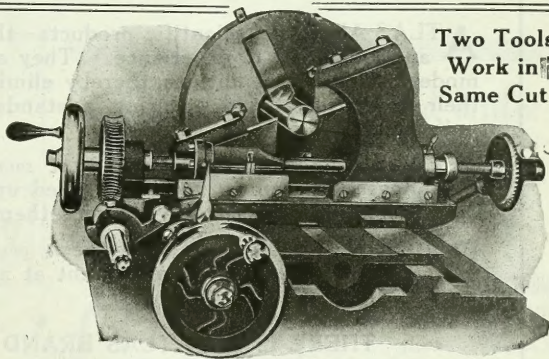
Each tool is rigidly supported in a stationary block at an angle which permits a strong shearing cut.

WITH THIS MACHINE PRODUCTION CAN BE NEARLY DOUBLED, and the utmost accuracy maintained under the hardest of work.

Read full details. Write for catalogue.

Hurlbut-Rogers Machinery Company
South Sudbury, Mass., U. S. A.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow, Newcastle-on-Tyne.
H. W. Petrie, Toronto, Canada.

Two Tools
Work in
Same Cut

**Coal
Coke
Iron Ore**

Pig Iron
Victoria

FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada.

M.A. HANNA & Co.

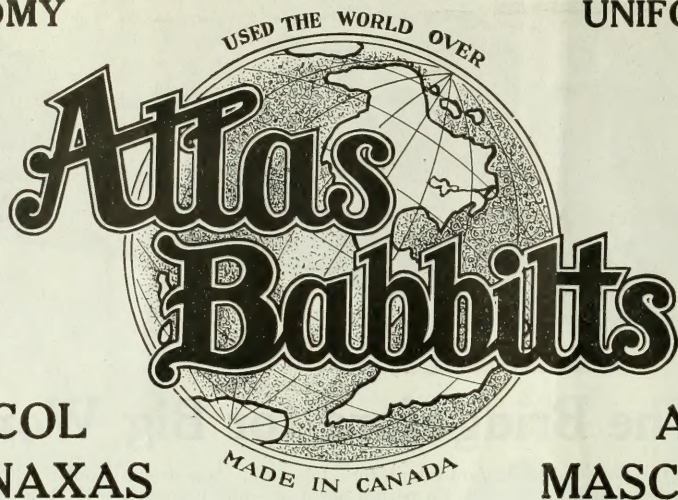
Sales Agents:
CLEVELAND

Canadian Office:
703 C.P.R. Bldg., Toronto



ECONOMY

UNIFORMITY



AMACOL

ATLAS

TENAXAS

MASCOT

TIN TOUGHENED  W. E. W. BABBITT

HAVE A WORLD-WIDE REPUTATION FOR UNIFORMITY

ATLAS Alloys are scientific products—the result of much patient research and long years of experience. They are manufactured under the most modern scientific conditions, thereby eliminating any element of chance in their composition and ensuring a standard maintenance of quality and uniformity.

ATLAS Brands are not alloys that *sometimes* give *satisfaction*. They are alloys that can be implicitly relied upon *always*. They are alloys with our *prestige* and *reputation* always behind them.

Do not let prejudice stand between *you* and *profit*. You can obtain the *maximum efficiency* from your plant at a *minimum of cost* by using ATLAS BABBITTs.

THERE IS AN ATLAS BRAND TO MEET ANY NEED

NO SHOCK TOO SEVERE

NO WEIGHT TOO HEAVY

NO SPEED TOO GREAT

Atlas Metal and Alloys Company of Canada, Limited

MONTREAL

Sales Agents:

The Canadian B. K. Morton Co., Limited

MONTREAL

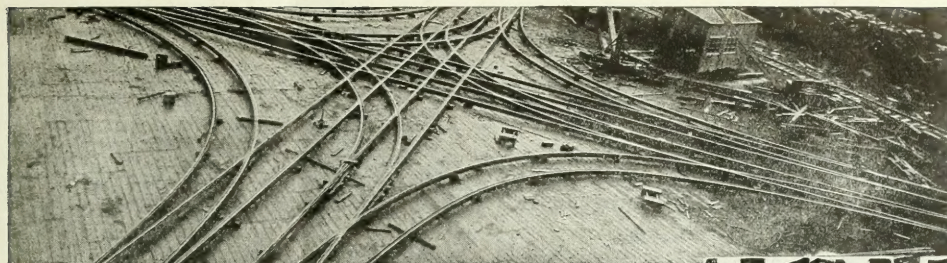
49 Common Street

Phone M. 3206

TORONTO

86 Richmond Street East

Phones M. 1472-1473



Solid Manganese Steel
Intersection for Montreal
Tramways Company.

Steel Casting

Canadian Steel Foundries, LIMITED
MONTREAL WELLAND

For Hydraulic, Mill Gear, Locomotive, Rolling Stock, Marine—in fact we make castings of any size and any kind—Manganese, Vanadium, Titanium, Chrome, Nickel, etc. Dependable products always.

SISCO

We guarantee shipment
within 24 hours of
receipt of order

"Extra"
"Special"
"High
Speed"

Tool Steels

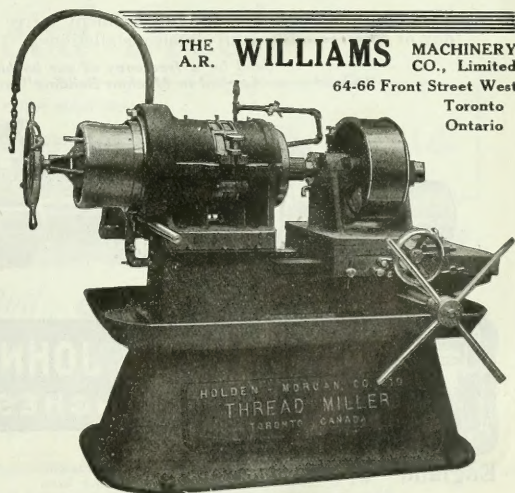
*Made in
Sweden
from selected
Dannemora Ore*

We also carry in stock
Solid and Hollow Drill
Steel, Die Blocks, "SIS-
CO" Welding Wire, Drill
Rod and Swedish Iron.

Swedish Steel & Importing Co., Ltd.
MONTREAL, QUE.

The Life of a Thread Miller

Depends not upon the amount of work it does, but the ease and thoroughness with which the work is done. These Thread Millers are noted for these qualities. Its quality of work is unrivalled. Our Service Department will give you all the particulars. *Write us!*



THE WILLIAMS MACHINERY
A.R. CO., Limited
64-66 Front Street West
Toronto
Ontario

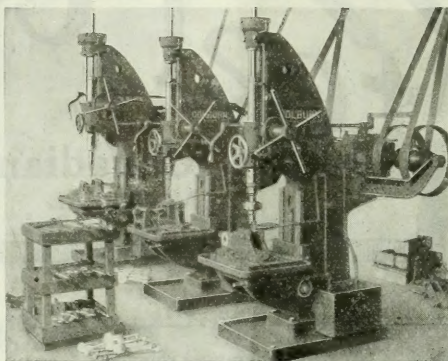
The Johnson Friction Clutch Is Being Used As A Part Of This Machine

In the Tapping Attachment on All Sizes of Colburn Drill Presses

The Levers in front of the Colburn Drill Presses illustrated, start and stop the operations.

"Johnsons" are installed in connection with the tapping attachments of all sizes of Colburn Drill Presses and "Johnson" efficiency maintains the "Colburn" standard of mechanical perfection in drill presses.

JOHNSON FRICTION CLUTCHES are especially well adapted for giving easy control on starting and stopping all kinds of tools, as they are mechanically correct, strongly made and very durable.

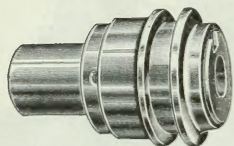


Courtesy Colburn Machine Tool Co., Franklin, Pa.

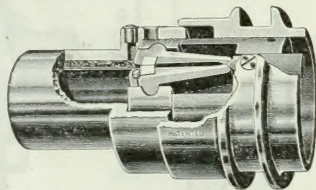
Johnson Friction Clutches Give Easy Control to All Types of Machines

The service of our engineering department is free to anyone for solving every-day or special problems in clutch installations.

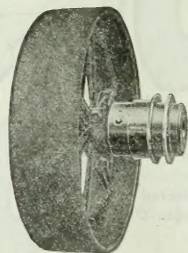
Send for a free copy of our booklet entitled "Clutches as Applied in Machine Building" and Yellow Data Sheets.



Single Clutch—Exterior



Double Clutch



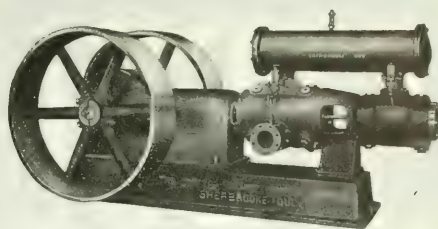
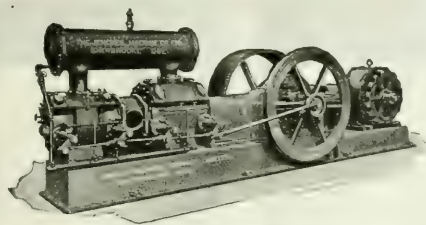
Single Clutch with Pulley Mounted

THE CARLYLE JOHNSON MACHINE CO.
MANCHESTER, CONN.

England—The Efundem Co., 159 Gt. Portland St., London, W., England. Sole Agents for the British Isles.

AUSTRALIA: Edwin Wood, Pty., Hardware Chambers, 231 Elizabeth St., Melbourne, Victoria.

Canada—Williams & Wilson, Ltd., 320 St. James St., Montreal.
Canadian Fairbanks-Morse Co., Limited, Toronto.



Compressor Problems Vanish

In a comparative test the quality of a machine will then be judged fairly. We invite your comparison. Our confidence that these machines excel is not only based on our knowledge

of their construction, but also because of the manner in which they appeal to our customers. We know they are built right. Our patrons have proved it. Let us get together.

Jenckes Machine

Works: ST. CATHARINES, ONT.
Works: SHERBROOKE, QUE.



Company, Limited

Sales Offices: 710 C.P.R. Bldg., Toronto; 908 E. T. Bank Bldg., Montreal; West Chester Ave., St. Catharines; Cobalt, Ont.; Exchange Bldg., Vancouver

DOUBLE MUSKET

High Speed Steel

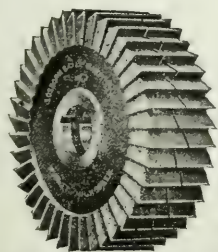
Carbon Steel

Gauge Steel

Alloy Steels

SOLE MAKERS

Samuel Osborn & Co. Ltd.
SHEFFIELD



*Twist Drills and
Reamers, Milling
Cutters and Slit-
ting Saws*



Sam'l Osborn (Canada)
Limited

Head Office and Works: Montreal, P.Q.

Branch Office: Toronto, Ontario

If any advertisement interests you, tear it out now and place with letters to be answered.

STEEL

FOR
**SHRAPNEL
SHELLS
AND SHELL BLANKS**

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

**Nova Scotia Steel
and Coal Company
Limited**

Head Office: NEW GLASGOW, N.S.

Western Sales Office:

Room 14, Windsor Hotel, MONTREAL



"Red Cut Superior"

HIGH SPEED STEEL

YOU have thought of many qualities you would like to have in High Speed Steel Tools—such as cutting edges with long life, freedom from brittleness, great reserve strength and toughness to resist shocks and strains, tools that would not require special heat treatment, tools that would take deep roughing cuts or fine smooth finishing cuts, and in addition, could be worked at higher speeds than you ever dreamed of. All these virtues and many more are contained in "Red Cut Superior", a First Quality High Speed Steel. Furnished in Annealed Bar Stock, Discs, and Treated Tool Holder Bits.

Are your tools made of **Red Cut**?
Send for folder

VANADIUM - ALLOYS STEEL COMPANY

Pittsburgh, Pa.

Works at Latrobe, Pa.

ESTABLISHED 1870

W^M. ATKINS & C^O., L^{TD}.

TRADE MARK



Reliance Steel Works
SHEFFIELD, ENG.

TRADE MARK



TRADE MARK

of the Famous

WACO

Brand

High Speed Steel and Twist Drills

"DOUBLE WACO" Quality

Specially Adapted for all kinds of
MUNITION WORK

"Turtle" Brand


High Class Tool Steel, Files, etc.
of all descriptions.

For particulars apply to our
Sole Representatives for Canada

GEO. A. MARSHALL & CO.

70 Lombard Street Toronto, Ontario





SaBeN ExTrA
HIGH SPEED STEEL

*The most
Economical
and Efficient
Steel for
Machining
Shells*

"Extra" Die Steel another good one

Manufactured by
**SANDERSON BROTHERS &
NEWBOULD, Limited**
SHEFFIELD, ENGLAND

H.A. DRURY COMPANY, LIMITED
MONTREAL TORONTO NEW YORK



**High-Speed
STEEL**

The tools that are made with "Wolfram" High Speed Steel are warranted to be super-keen at the edge and super-strong at the neck.

WOLFRAM

Embodies a true and permanent alloy of Tungsten, Chrome, Vanadium and Iron. No better High Speed Steel in the world.

**VULCAN CRUCIBLE
STEEL COMPANY**
ESTABLISHED 1900
Aliquippa Pa., U.S.A.

Represented in Canada by
Messrs. Norton, Callard & Company, Montreal.



**ELECTRITE-
URANIUMTM**
High-Speed Steel


Will amaze you in its ability to remove metal

The introduction of this rare element—"URANIUM"—into the mixture of our already superb cutting product, has supplied the final perfection of the qualities of toughness and durability which has been the hitherto impossible goal of metallurgical hopes.

Electric Furnaces, Automatically regulated, produce inevitably similar results at every melt.

We are ready to assist your inquiry in every way possible.

Write
Latrobe Electric Steel Company
Latrobe, Pennsylvania





This Wonderful Metal

is made in different Grades and can be adapted for
A MULTITUDE OF OPERATIONS.

Remarkable Results are Being Obtained

in machining Steel, Iron, Bronze, Brass,
Ivory, Celluloid, etc.

DIES OF ALL DESCRIPTIONS

are cast for hot or cold drawn work.

*Write us for particulars, stating the class of work
you are on, and what your difficulties are. Our
Engineering Staff is at your disposal.*

DELORO SMELTING & REFINING CO., LIMITED

Head Office

- - DELORO, ONTARIO

TORONTO
200 King Street West

MONTREAL
315 Craig Street West

CO CO TURNING STEEL TOOL HOLDER BITS

"THE BIT WITH THE GROOVE"



What CoCo is Doing on Other Jobs

"CoCo" will do the same in your shop,—will cut faster or longer than other steels. Here are some proofs:—

"CoCo" is cutting Semi-steel Castings at 100 ft. per minute, cut $1\frac{1}{2}$ " deep. 30 hours' continuous service between grinds.

"CoCo" is turning Cast Iron Hydrant Caps at 169 ft. per minute, feed $\frac{1}{8}$ ", cut $\frac{3}{8}$ " and turns 4 hydrants per grind where less than one per grind used to be standard.

"CoCo" is turning .40 Carbon O. H. Forged Rams at 95 ft. per minute, feed $\frac{1}{4}$ ", cut $\frac{3}{32}$ " turning 3 rams in the same time it formerly took to do one.

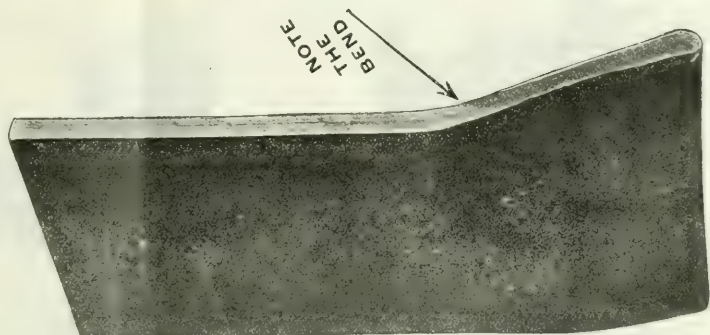
CAN YOU BEAT IT?

CoCo Steel does not do stunts—It does the work. It will do yours as well. Ask us.

COLONIAL STEEL COMPANY

PITTSBURGH BOSTON DETROIT NEW YORK PHILADELPHIA ST. LOUIS CHICAGO

Cutting Off Tool



URANIUM High Speed Steel

NOTE THE BEND

This tool bent in severe service—the two companion tools which were not Uranium broke. The tool shown above did three times as much work as the regular tool.

“Uranium Tools Stand Up On The Job”

SEE YOUR TOOL STEEL MAN OR WRITE US

Standard Alloys Company

FORBES AND MEYRAN AVENUES

PITTSBURGH

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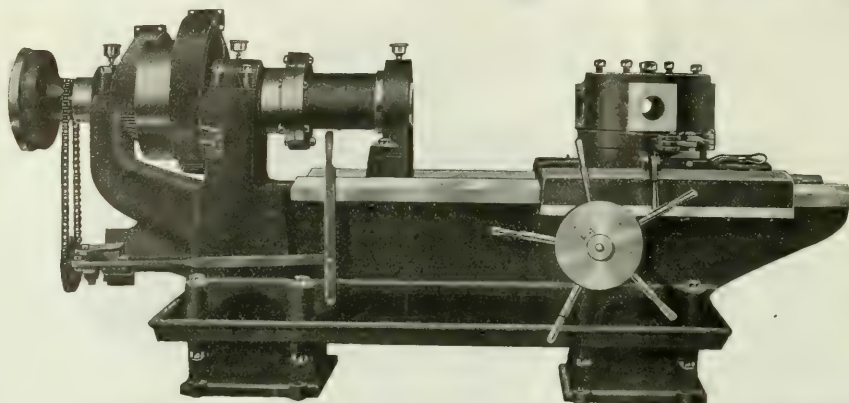
PENNA.

If any advertisement interests you, tear it out now and place with letters to be answered.

IN STOCK—FOR IMMEDIATE SHIPMENT

SUBJECT TO PRIOR SALE

H.E.W. Boring Lathes To Handle Shells Up To 6"



MADE IN CANADA

SPECIFICATIONS ON REQUEST

HYDE ENGINEERING WORKS

CONSULTING AND MANUFACTURING ENGINEERS

P.O. Box 1185

27 William Street, MONTREAL, P.Q.

IF YOU WANT THE

BEST
ASE PLUGS,
UY
ANFIELD'S

Have in stock for immediate shipment either threaded or bevel Plugs for 4.5", 5" and 6" High Explosive Shells. These are shipped subject to acceptance of Government inspector at your plant.

Capacity, 3,000 per day.

Write for prices.

EDWIN J. BANFIELD
STAIR BLDG. ∴ TORONTO, ONT.

Manufacturer of Plug Milling Machines for above size shells. Prices and deliveries on application.

Potter & Johnston 15-inch Universal Shaping Machine

15-inch Stroke

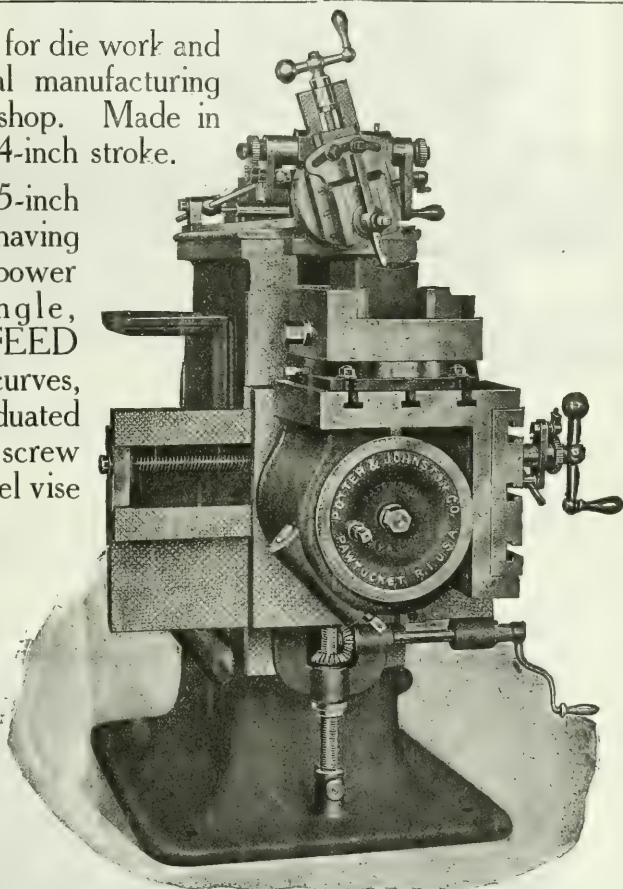
—

24-inch Stroke

The standard of efficiency for die work and tool room service, general manufacturing purposes and the repair shop. Made in two sizes—15-inch and 24-inch stroke.

Illustration shows the 15-inch model with swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

The simplicity of design, convenience of operation, extreme care exercised in their manufacture, and the many universal features of this machine, combine to make it the most efficient and reliable tool of its type.



WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

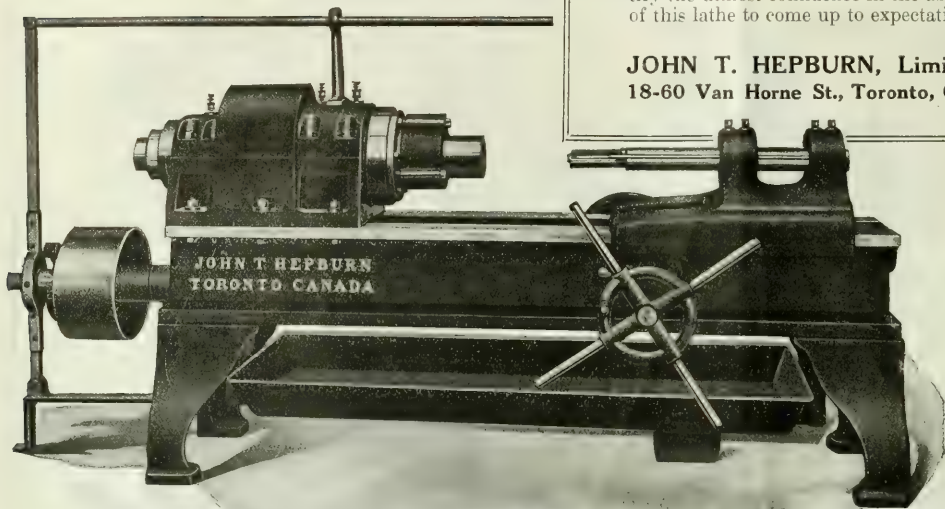
Works and Warehouse: GALT, ONT., CANADA

If any advertisement interests you, tear it out now and place with letters to be answered.

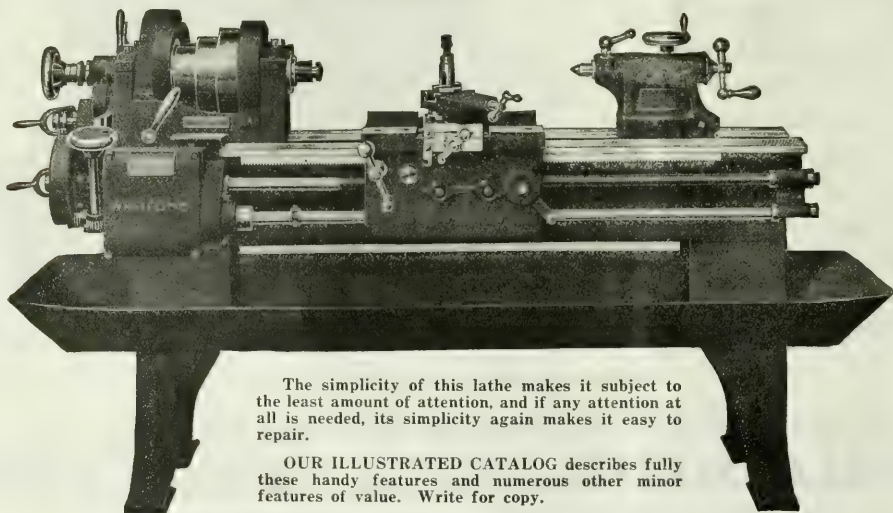
Are You Getting Results ?

Results are dependent upon two things: speed and quality. If you get speed without quality, yours is a losing proposition. This Hepburn 6" boring lathe gives both speed and quality. The results obtained by Canadian users justify the utmost confidence in the ability of this lathe to come up to expectations.

JOHN T. HEPBURN, Limited
18-60 Van Horne St., Toronto, Ont.



The Whitcomb-Blaisdell Tool Room Lathe



The simplicity of this lathe makes it subject to the least amount of attention, and if any attention at all is needed, its simplicity again makes it easy to repair.

OUR ILLUSTRATED CATALOG describes fully these handy features and numerous other minor features of value. Write for copy.

Whitcomb-Blaisdell Machine Tool Co.

Engine Lathes

WORCESTER, MASS.

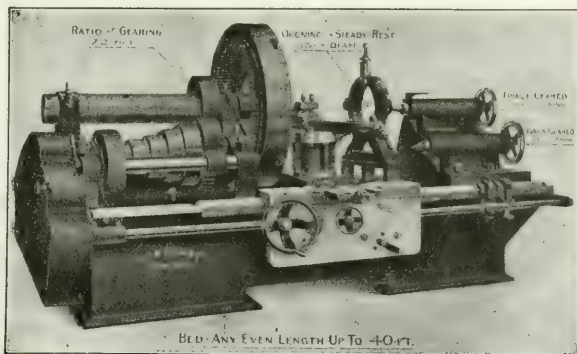
Metal Planers

Mention this paper when writing advertisers. It will identify the proposition about which you require information.

One Ship- building Plant

wrote to six differ-
ent Lathe-Builders

and bought McCabe's "2-in-1"
Double-spindle Lathe—on a
30-ft. bed—because it was
"different" and built especi-
ally for such a wide range of
work.



**McCABE'S "2-in-1" Double-Spindle Lathe - 26-48 inch Swing
As a 48 inch Triple-Geared Lathe**

What other big Lathe can you get, and have full use of your Lathe, whether you have big or small work?
What Lathe Manufacturers except McCabe could make such a low price possible?
No other Lathe-builder turns out 48-inch Lathes in such big lots at a time, making the parts all duplicate and interchangeable.
And in addition to the 48-inch Triple-geared Lathe, the 26-inch is the "Lathe plus" feature McCabe offers you—at no extra cost.
DOUBLE service—convenience and capacity—all described in Latest Bulletins.

J. J. McCABE, 149 BROADWAY, NEW YORK

Improved Centering Machine

**Mr. Shell
Manufacturer:**

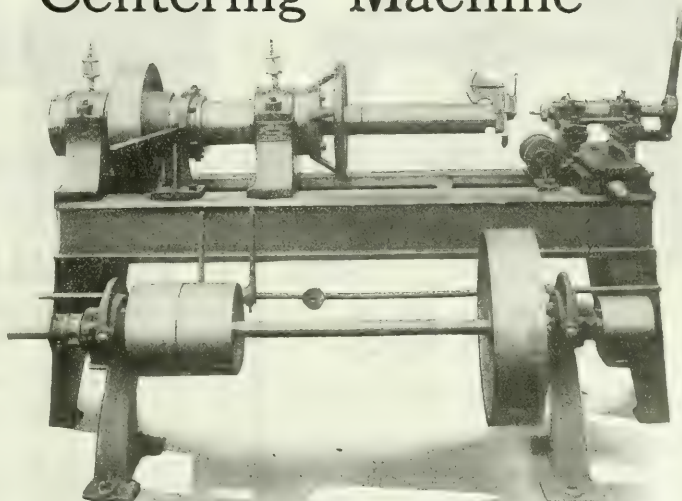
The importance of
centering is obvious.

This tool is giving
real satisfaction
every day and stays
on the job.

Write for price and
description.

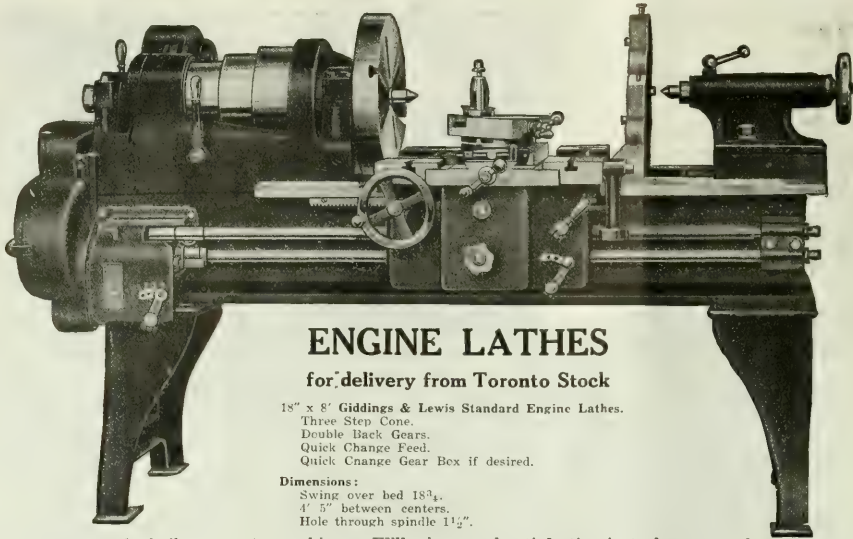
Delivery, ship 10
days after order.

Shipping weight
2040 pounds.



VICTORIA FOUNDRY COMPANY, LIMITED
OTTAWA, ONTARIO

If any advertisement interests you, tear it out now and place with letters to be answered.



ENGINE LATHES

for delivery from Toronto Stock

18" x 8' Giddings & Lewis Standard Engine Lathes.
Three Step Cone.
Double Back Gears.
Quick Change Feed.
Quick Change Gear Box if desired.

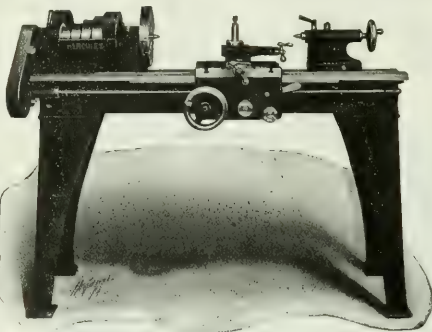
Dimensions:

Swing over bed 18 $\frac{3}{4}$."
4' 5" between centers.
Hole through spindle 1 $\frac{1}{2}$ ".

These are strongly built, accurate machines. Will give equal satisfaction in tool-room or shop. The following extras can be furnished if desired: Taper, Relieving or Draw-in attachment, Waving attachment, Hexagon turret on carriage, Pan pump and piping.

Write for full specifications and prices.

Garlock-Walker Machinery Co., Ltd., 32 FRONT ST. WEST, Toronto
Telephone MAIN 5346



LATHES

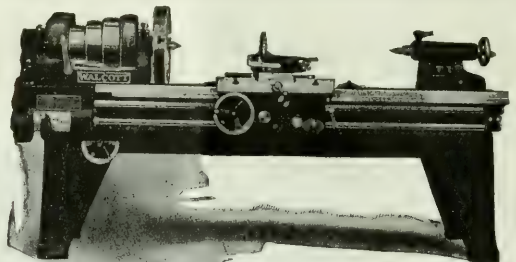
12", 16", 18" and 21" swing

Strictly modern in design, rigidity
and accuracy guaranteed.

Himoff Machine Company

45 Mills Street

Astoria, City of New York, N.Y.



THE WALCOTT LATHE

is backed by lathe-building experience
extending over 35 years

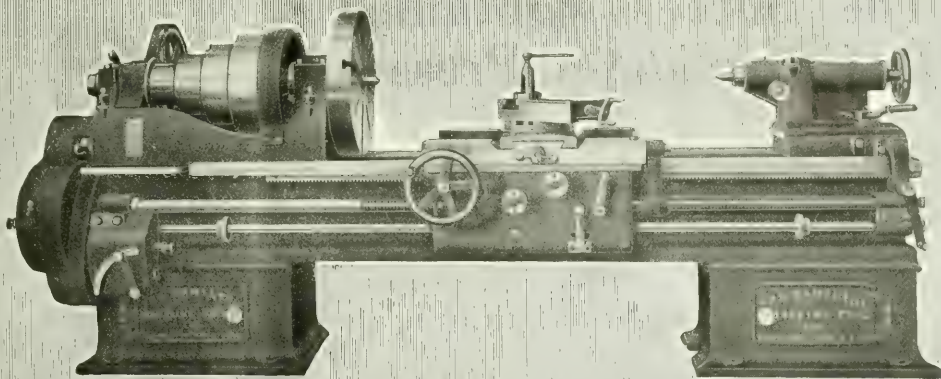
These are features of Walcott Lathes: drop-forged gears in apron; all-steel gears in gear-box; large ways on bed, all gears completely enclosed. Parts are interchangeable. Rigid headstock and tailstock.

You'll get the full story in our printed matter. Send for it surely if you are about to buy a lathe.

WALCOTT LATHE COMPANY

Successors to

Walcott & Wood Machine Tool Co., Calhoun St.,
Jackson, Michigan



Hamilton Lathes

*For 25 Years
Makers of
Fine Machine Tools.*



*The "Hamilton" Line
has a Reputation
to Sustain.*

THERE are two phases of production that require expert attention; those of *quality* and *quantity*. We have made a study of them for your benefit. The result is that we are able to offer you machine tools that give the highest efficiency and will still keep down the cost of production.

Illustrated here is one of our lathes. A close study on your part will partly reveal the care we have taken to give you a machine that is fitted to the needs of the day—greater production.

The "Hamilton Line" of machine tools is very complete and users are never tired of telling others of their features. A letter will command our immediate attention.

WRITE US TO-DAY.

The Hamilton Machine Tool Co.
HAMILTON Sole Agents for Ontario: OHIO, U.S.A
H. W. PETRIE, LIMITED, TORONTO, ONT.

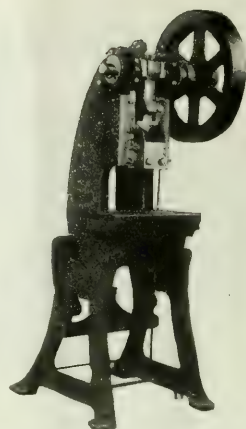
If any advertisement interests you, tear it out now and place with letters to be answered.

The Success Obtained by Consolidated Presses

is due to the generous and correct proportion of the frame, the rigid bed construction, the extra long and wide slideways, the lengthy main bearings, the powerful clutch, large diameter and wide faced gears, steel pinions, the accurate machining and fitting of the various parts.

These are all vital points to be considered in buying presses.

Duplicate orders from satisfied Consolidated Press users are an indication that these features count.



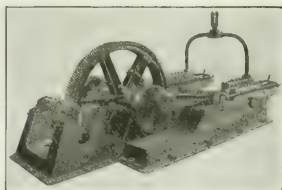
Consolidated Press Company

HASTINGS

LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.

MICHIGAN

Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver



ELMES

18" Stroke Hydraulic Pump

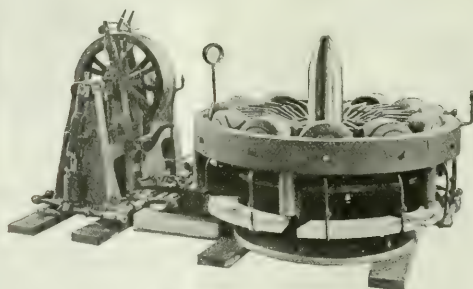
for maximum pressures and capacities, for 250 horse-power motor—a pump designed to meet the demand for a high-pressure outfit of large capacity, and one able to withstand the severe usage of present-day practice.

Other designs for all pressures and capacities.

**Charles F. Elmes Engineering
Works**

217 No. Morgan Street

CHICAGO, ILL.



The New "West" Banding Press

For 9.2" and 8" shells

**12 Cylinders; Ample Power; Ample
Strength; Reasonable Price.**

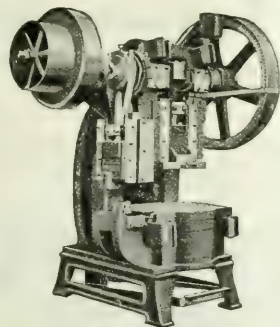
NO ACCUMULATOR REQUIRED.

The West Tire Setter Co.

255 Mill Street, Rochester, N.Y.

THE "TOLEDO"

Trimming Presses for Hot or Cold
Drop Forgings



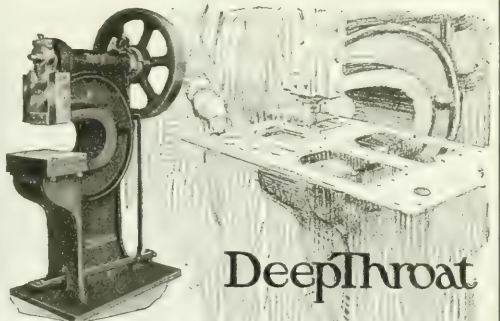
such as crank shafts, gear blanks, wrenches and other tools. A few of their advantages: Massive slide construction with extra long ways and gibs. Outer slide can be arranged for blanking or punching, the two slides permitting the use, in combination, of a

double set of dies for two operations in trimming or punching hot or cold work. Construction of press is very substantial and weight is carefully proportioned.

The

Toledo Machine & Tool Company

Toledo, Ohio



Deepthroat

"STILES" No. 2-B

For reaching into the center of large sheets of metal, this model of the "Stiles" type of Press is provided. The massiveness of the frame and its special design make it rigid, even under the most severe punching strains.



E. W. BLISS CO.



Brooklyn, N.Y., U.S.A.

1857

CHICAGO OFFICE

DETROIT OFFICE

1917

People's Gas. Bldg.

Dime Bank Bldg.

CLEVELAND OFFICE - Union Bank Bldg.

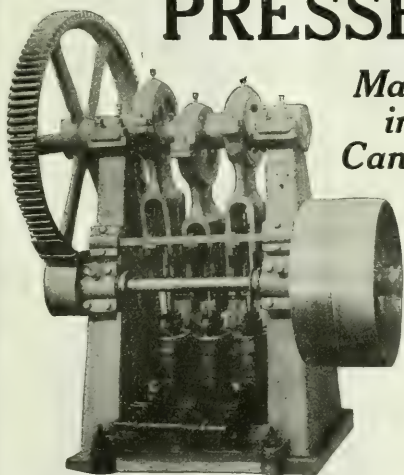
LONDON, S. E., ENGLAND

PARIS, FRANCE

Pocock St., Blackfriars Road 100 Boulevard Victor-Hugo St. Ouen

PRESSES

Made
in
Canada



Hydraulic Presses, Pumps and Accumulators for all purposes

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited
TORONTO, CANADA

Triple Purpose "METALWOOD" COMBINATION

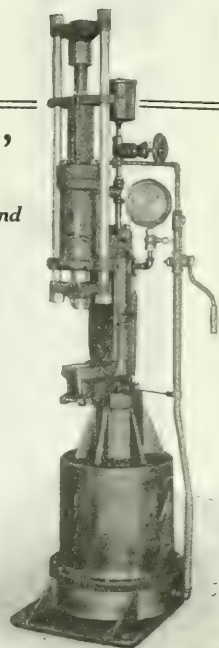
*Forcing, Broaching and
Straightening Press.*

Its value is in the many uses to which it is adaptable. Auxiliary tables and fixtures add greatly to its usefulness. It is not "encumbered" with a single excess part. Built for production.

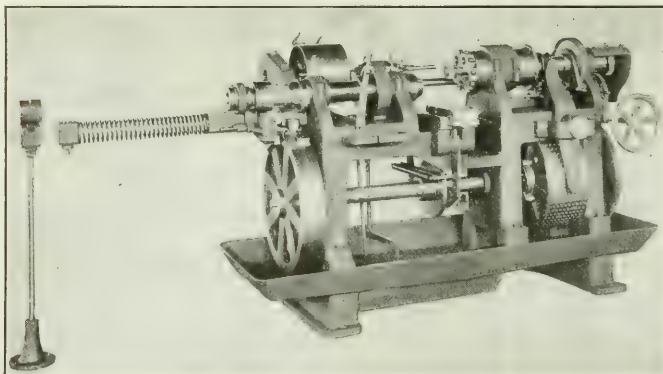
**Metalwood
Mfg. Co.**

**Leib & Wight Sts.,
DETROIT, MICH.
U.S.A.**

For Great Britain and
Continent address Gaston
E. Marbaix, Coronation
House, 4 Lloyds Ave.,
London, E.C., England.



If any advertisement interests you, tear it out now and place with letters to be answered.



A NEW DEPARTURE IN TURRET INDEXING

By an indexing device—selective in type—one or more idle holes—holes not carrying tools—can be skipped in indexing without pause or loss of time—a feature that makes for increased production.

Chicago Automatics stand up under the strain of day and night service and economically turn out any screw machine product in minimum time. They are the result of 10 years' extensive screw machine manufacture. Drop a card now for details and specifications.

The John MacNab Machinery Co.

90 West Street

New York

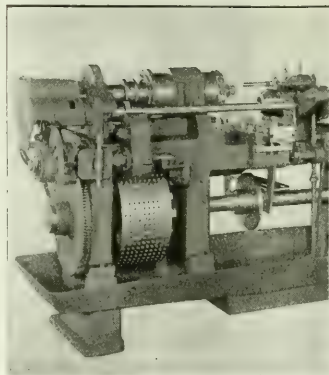
European Representative—JOHN MACNAB, Hyde, England

Quick Delivery

In less than six weeks from the time your order reaches us we can place

Chicago Automatic Screw Machines

in your plant ready for operation.



1 Second

One completed, perfectly finished rivet per second. That is the Grant speed. Not for a short time or a long time, but all the time. No hammer marks showing. Any degree of tightness or looseness desired. This great speed should materially reduce your operating cost and increase output.

Our catalogue will reveal a great deal more. Write for it.

Grant Mfg. & Machine Co.

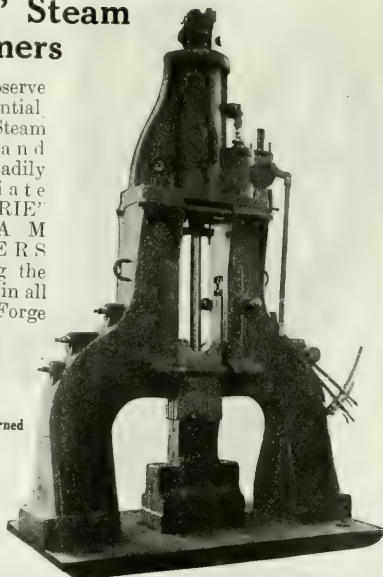
HOLLAND AVE.

BRIDGEPORT, CONN., U.S.A.

"Erie" Steam Hammers

Closely observe this substantial, well built Steam Hammer and you will readily appreciate why "ERIE" STEAM HAMMERS are getting the preference in all modern Forge Shops.

They have earned their enviable reputation.



ERIE FOUNDRY COMPANY

ERIE, PA.

U. S. A.

Bilton Automatic Gear Millers—Spur or Bevel Gears

CAPACITY

No. 1	- -	14 Pitch
No. 2	- -	10 Pitch
No. 3	- -	8 Pitch

The Bilton Machine Tool Company

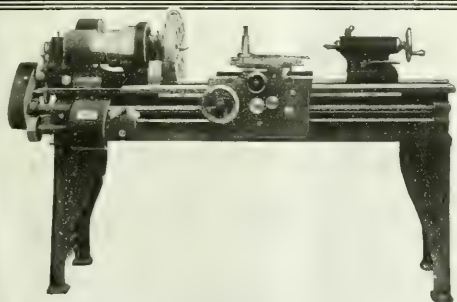
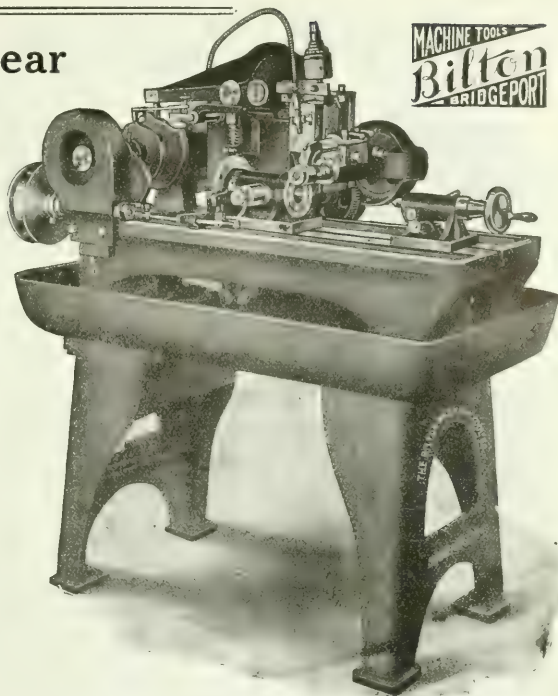
Succeeding The Standard Mfg. Company
Housatonic Ave., Bridgeport,
Conn., U.S.A.

Also Manufacturers of —
Plain Horizontal Millers
Automatic Millers
Plain and Ball Bearing
Bench and Column Drills
Riveting Machines
Milling Cutters

Catalog 30 on request.

Foreign Agents:

Alfred Herbert, Limited
M. Mett Engineering Company
Chas. Churchill Company, Limited



13-inch Engine Lathe

The Filsmith Way

This is one way to make a short-cut to greater production and economic operation. With a 13 3/4" swing and 18 spindle speeds it will take in a great range and variety of work. Guaranteed material and workmanship are two expressions of our confidence in this machine. Write us and let us send you full specifications and information.

THE PHILIP SMITH MFG. CO.

Sidney,

Ohio,

U.S.A.

For Rapid Production and Accurate Work

USE THE

"BRIGGS"

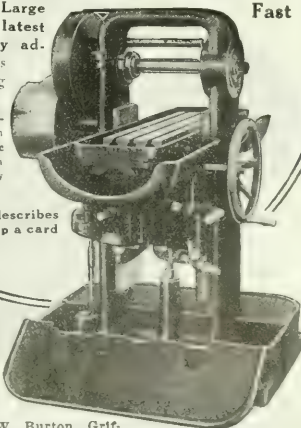
The Briggs Miller handles work no other machine of its size can touch. It is a manufacturing machine. On account of its rigid construction it will produce accurate work when running at a high rate of speed and feed.

The Base Tank and Large Gear Pump is the latest addition to its many advantages. Tank holds 20 gallons of cutting lubricant.

Pump never requires priming and will deliver ten gallons per minute to the cutters, keeping them cool when run at very high speed.

Our booklet describes fully. Drop a card for it.

Fast



Gooley & Edlund

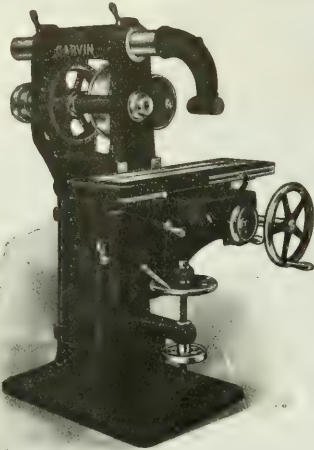
Inc.

Cortland, N.Y., U.S.A.

Foreign Agents: Allied America, France, Belgium, Italy, Switzerland, Machinery Company of Russia, Scandinavia, C. W. Burton, Griffiths & Co., London, Manchester and Glasgow, Barandiaran, Metivier, Gazeau & Cia, San Sebastian, Spain.

GARVIN No. 21 Plain Miller

Back Geared



No. 21 B.G. PLAIN MILLING MACHINE
Back Geared
Use Code - Abjeet

For Plain and Gang Milling for general manufacturing, and is used mostly in gangs of 5 or 6 machines to one operator. Spindle runs in adjustable bronze boxes, and is driven by a 3" belt through back gears (3 to 1).

Knee is our improved solid top design, rigid and stiff to resist side pressure of heavy cuts.

DIMENSIONS:

Automatic Feed of Table	18 in.
Adjustment in line with Spindle	6 in.
Vertical adjustment under Spindle	13 in.
Table, inside Oil Pockets	6 x 30 in.
Changes of Speed	6
Changes of Feed	6
Net Weight, Skidded	1,575 lbs.

For Further Information {ASK YOUR DEALER
or WRITE US DIRECT

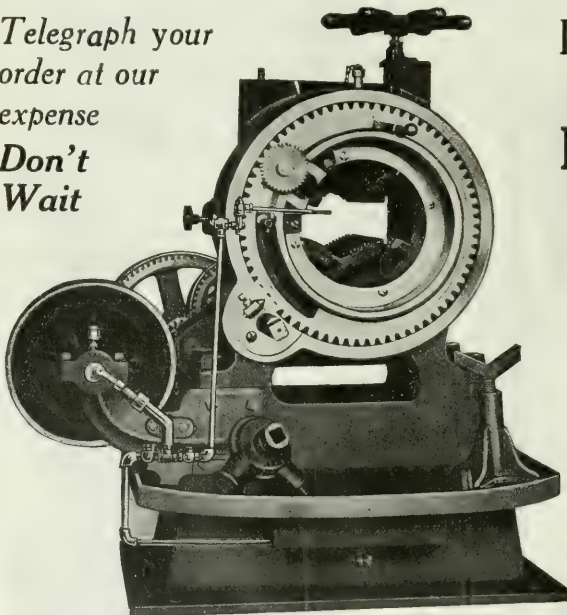
IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY
Spring and Varick Streets (Visitors Welcome) 50 Years New York City

*Telegraph your
order at our
expense
Don't
Wait*



In These WAR Times

If you have need of a Pipe Cutting and Threading Machine

You want to know three
things and in this order:

Delivery

All sizes up to 15", for either Hand, Belt or Electric drive, kept in stock for immediate shipment. No waiting.

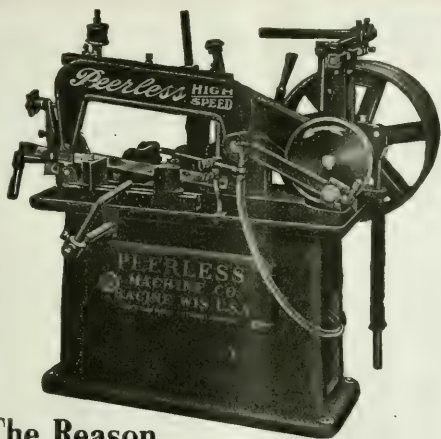
Quality

The original FORBES. Our specialty since 1882. More than 25,000 in use.

Price

Less than any other Standard Machine on the market, and less than half of many. Our system is the reason.

THE CURTIS & CURTIS CO., 115 Garden Street, Bridgeport, Conn.



The Reason For So Many Repeat Orders

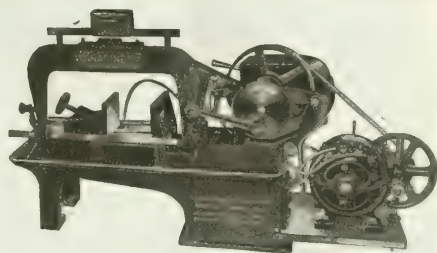
after comparative tests is that no magnifying glass is necessary to distinguish the increased production and the better class of work on the PEERLESS High-Speed Cutting-off Saw.

A third order just came in from one of the largest concerns in the United States, and is it not a fact after a firm has standardized on a certain make of tool that some real results must be produced in order to effect a change?

One of our customers writes: "It takes us only 1-15th of the time to cut our stock on the PEERLESS that it did on our other machine."

If you are open to conviction we have a proposition to offer that no manufacturer can afford to pass up.

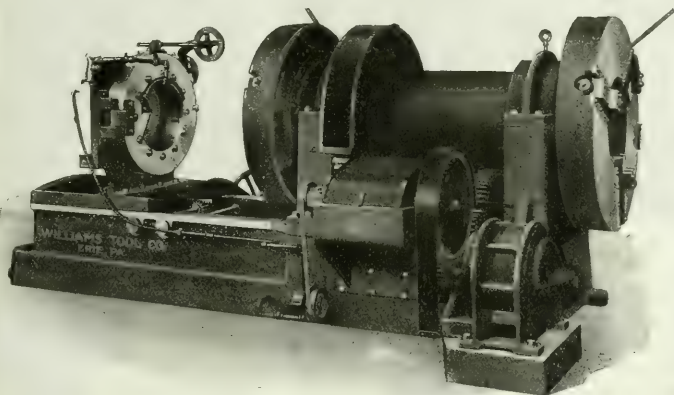
PEERLESS MACHINE CO. 1607 Racine St.
RACINE, WIS., U.S.A.



Your Cutting

How do you do it? Are your methods giving satisfaction? Are you getting the maximum production? With a Racine to compare results with you will get a better idea of the results you should be getting or could get. Metal cutting has been our study. It is the purpose for which our machines are built. We stand ready to co-operate with you in your cutting problems. Write us for information.

Racine Tool & Machine Co.
15 Melbourne Ave., Racine, Wis., U.S.A.



Highest Award Panama Exposition

Williams Tool Company

Erie, Penn., U.S.A.

Canadian Agents:
The A. R. Williams Machinery
Co., Ltd., Toronto, Canada

European Agents:
Universal Machinery Corp.
London, England

Pipe Machines

Threading

Cutting-off

Quality will tell in every test. At the Panama Exposition the Williams Cutting-off Machine was given the highest award. What does that mean to you?

It means that your pipe-threading and cutting-off operations will cease to give you any cause to worry if you are "Williams" equipped.

Made in 11 different sizes, each machine handling 8 to 10 consecutive sizes of pipe from $\frac{1}{4}$ " to 18" dia.

Williams cutting-off machine is an investment, not an expenditure. It realizes exceptional dividends.

Write us at once!

If any advertisement interests you, tear it out now and place with letters to be answered.

Starrett Tools



The Starrett Vernier Height Gage

assures the toolmaker and machinist of accurate guidance in laying out and checking up the progress of work.

Starrett tools are recognized as the standard for fine precision instruments where accuracy and quality of workmanship are essential.

Send for our free catalog No. 213 describing the 2100 styles and sizes of fine measuring instruments.

The L. S. Starrett Co., Athol, Mass.

The World's Greatest Toolmakers
42-617



SMOOTH AS GLASS

That's the kind of grinding you want
That's the kind you get

WITH THE
Dominion Universal Grinder

ADD TO THIS

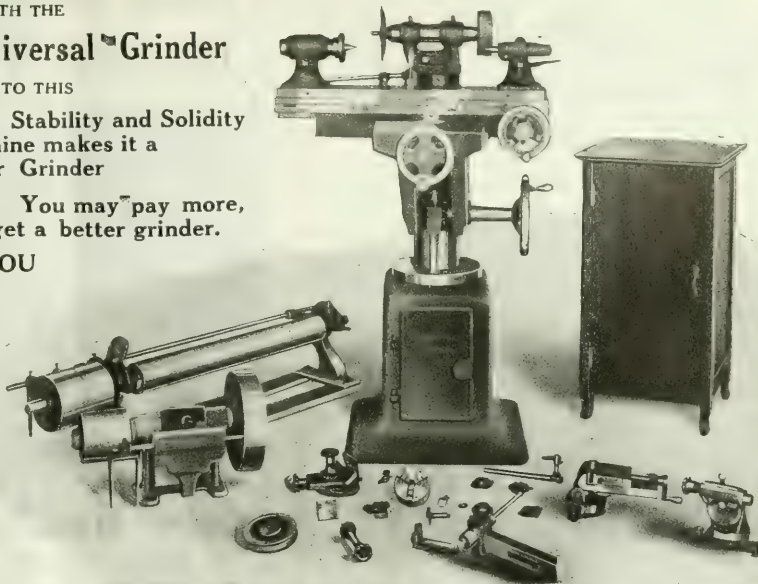
Ease of Operation, Stability and Solidity
of the Machine makes it a
Master Grinder

Try One and See. You may pay more,
but you cannot get a better grinder.

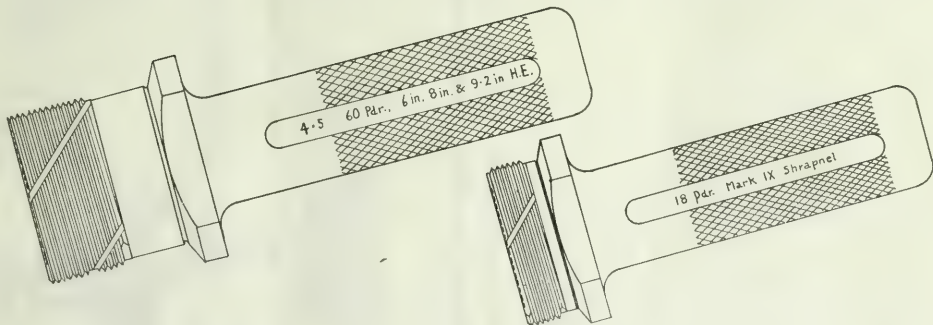
LET US TELL YOU
MORE
ABOUT IT

**Dominion
Machinery
Company**

110 Church St.
Toronto, Ont.
Canada



FUSE HOLE GAUGES

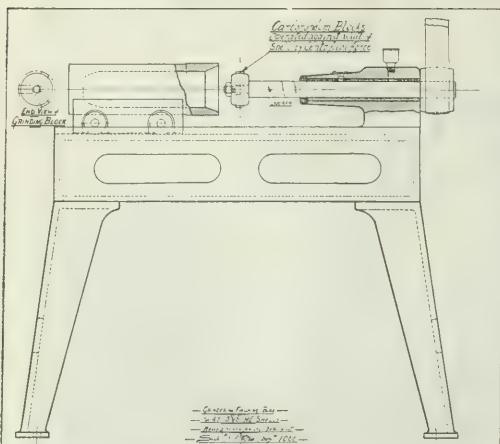


Manufacturing and inspection fuse hole
gauges for all size shells. A surplus
stock enables us to ship immediately.

Windsor Machine & Tool Works

Windsor, Ontario

If any advertisement interests you, tear it out now and place with letters to be answered.



Smooth Bores

We have designed for our own use a simple and inexpensive grinder to give the final touch to the bore of our shells.

It does the work, and we will have some of these machines on the market shortly.

Write us for our proposition.

**Marsh & Henthorn
Limited**

BELLEVILLE, ONTARIO

Stow Shell Grinders Increase Production



**Suspended
Pedestal
Mounted
on Truck**

**Any Size
Any Current**

**Immediate
Shipment**

Stow Manufacturing Co.

Binghamton, New York, U.S.A.

Oldest Portable Tool Manufacturers in America

Assuming that you want a grinder that is better than the average—

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head and tailstock—it will pay you to investigate the

Standard No. 6 Universal Grinding Machine

In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapered and bored to take wheel arbors, and bearings are 1 in. in diam. and 2 1/4 in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by
sending for the full de-
tails—to-day.

Simmons Machine Co., Inc.

1001 Singer Bldg., New York City
981 Broadway, Albany, N.Y.





Van Dorn

ELECTRIC TOOLS

The utility of a portable drill is best decided when applied to your needs. There are two features of utility that should be seriously considered when installing a portable drill. Range of operations and adaptability. This "Van Dorn" Portable Drill will drill holes in anything from wood to armour plate. Its portable feature makes it adaptable to interior or exterior work. The quality of work is uniform regardless of the angle or position. An actual saving of 20% to 80% is effected. The cost of the drill is not to be compared with the savings resulting from its use. Its substantial and sturdy build will keep it safe from repairs. Write for full particulars.

Install Utility as Well as a Good Tool

R. E. T. PRINGLE, LIMITED

Manufacturers' Agents

OFFICES:

Tyrrell Bldg., 95 King St. E., Toronto

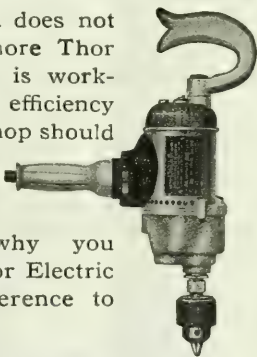
809 UNITY BUILDING - - MONTREAL
3402 OSLER AVE. - - VANCOUVER, B.C.
302 DONALDA BLOCK - - WINNIPEG, MAN.

Thor

UNIVERSAL Electric Drills

Licensed Under Burke
Universal Motor Patent

No shop which does not use one or more Thor Electric Drills is working to full efficiency which every shop should do during these critical times. Let us demonstrate why you should use Thor Electric Tools in preference to other makes.



Independent Pneumatic Tool Company

Office: 334 St. James Street, MONTREAL, QUE.
Toronto: 32 Front St. W. Winnipeg: 123 Bannatyne Ave., E.
Vancouver: 1142 Hemer Street

May We Repeat

THAT

P X H

TRADE MARK

QUALITY FILES

are the only files made in Canada using BEST CRUCIBLE CAST STEEL exclusively in their manufacture. What does that mean to the user?

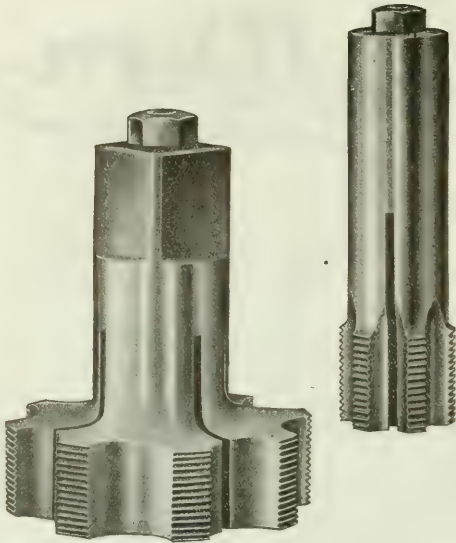
IT MEANS a keener cutting edge to the teeth, and longer life to the file. IT MEANS the stock has that "pep" in it so beloved of metal workers. IT MEANS that after a long and honorable career on the bench, there is still fine steel in the file which warrants the user in having it re-cut and put on the job again on less "fussy" work.

THAT IS TRUE ECONOMY.

Port Hope File Mfg. Co., Limited

Port Hope, Ont.

"Ask your jobber"



ADJUSTABLE FINISHING TAPS

Will they stand up?

Will they produce?

These are questions which are uppermost in the minds of present-day buyers of *Adjustable Finishing Taps*. And they mean a great deal to manufacturers at this time, when deliveries are of such vital importance.

Are your threading jobs moving as fast as you would like to have them?

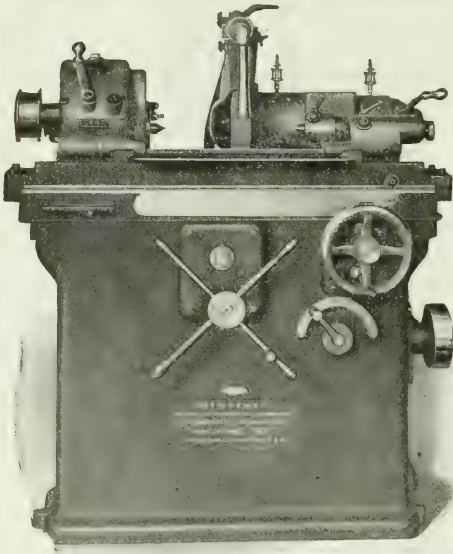
If not, tell us about it. We'll recommend a remedy for your threading troubles. If one of our standard products won't do, we'll prescribe a special tool. Forty years' experience and a factory devoted to specials enable us to give the best of service in screw-cutting problems.

Send for our general catalog. The most complete catalog of its kind published.

Wells Brothers Company of Canada, Limited
GALT, ONTARIO

Sales Agents: The Canadian Fairbanks-Morse Company, Limited, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.

FITCHBURG 6" x 20" MANUFACTURING GRINDER



NO doubt if you were to tabulate the parts being ground in your factory, you would find a large percentage being ground on machines of very much larger capacity than the FITCHBURG 6" x 20" and possibly for no other reason than that the smaller machines do not have the required power, rigidity, and the present-day grinding capacity.

The FITCHBURG 6" x 20" is designed and constructed to meet the grinding problems put up to machines of very much larger capacity.

Model "A" power feed No. grinding wheel speeds (3) 1300-1550-1800 R.P.M.

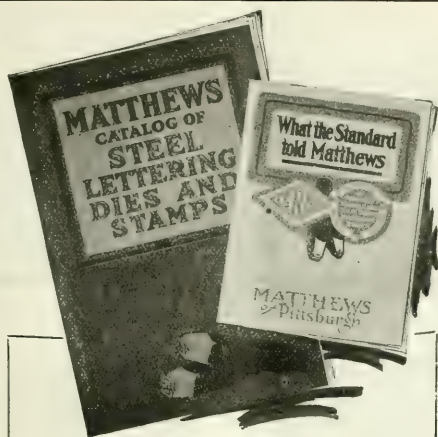
Weight of machine about 4100 lbs.

Floor space 52" x 66".

Fitchburg Grinding Machine Co.

76 Winter Street

Fitchburg, Mass.



Your Mark

On your product—is it the kind that proves your pride in the product? If your product is good, if its service is likely to recommend it, mark it so any one can easily tell who made it.

We make any form of a steel lettering die or stamp to mark your name, address, trade-mark, or any distinctive mark you desire to show on your product. Sixty-seven years in business as the largest manufacturers of our kind is the record behind Matthews steel lettering dies and stamps.

Our catalogue illustrates and describes a complete line of dies and stamps for every marking purpose. Send for it to-day.

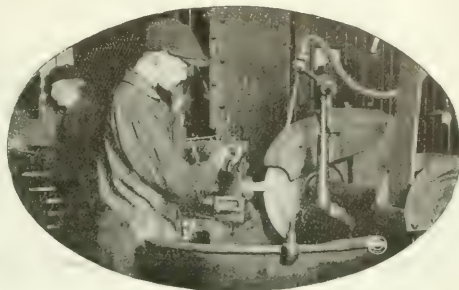
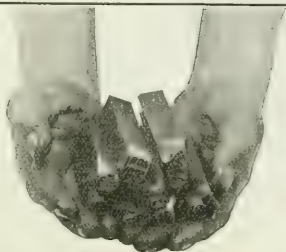
Jas. H. Matthews & Co.

Established 1850
Pittsburgh, Pa.

Distributors for Canada

The CANADIAN FAIRBANKS-MORSE CO.

Montreal, St. John, Toronto, Winnipeg,
Calgary, Vancouver, Ottawa, Quebec,
Saskatchewan, Victoria



Grinding High Speed Steel Tools With Alundum Wheels

The wheel in use here is a 24 M Alundum made by the silicate process. Wheel selection for high speed steel depends upon the machine and other shop conditions.

The usual grains and grades furnished are as follows:

Gisholt.....	20 M and N.....	Alundum Vitrified
	24 M to P.....	" Silicate
Sellers No. 1.....	20 and 24 L and M.....	" Vitrified
	20 and 24 L and M.....	" Silicate
Sellers No. 2.....	36 L.....	" Vitrified
	30 and 36 M.....	" Silicate
Taylor.....	24 O.....	" Silicate



NORTON COMPANY

WORCESTER, MASS.

Electric Furnace Plants:

Niagara Falls, N.Y. Chippawa, Ont. Can.

Canadian Agents:

The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria; F. H. Andrews & Son, Quebec, Que.



If any advertisement interests you, tear it out now and place with letters to be answered.



**THE CANADIAN
FAIRBANKS-MORSE
COMPANY, LIMITED.**



Manufacturing Plant Equipment

4—Tools and Supplies

Drills	Blacksmiths
Reamers	Tools
Taps	Anvils
Dies	Vices
Micrometers	Forges
Calipers	Blowers
Rules	Wrenches
Gauges	Grinding Wheels
Chucks	Oil Stones
Vises	Polishing Wheels
Lathe Tools	Watchman's
Hammers	Clocks
Files	Bolts
Saws	Locks, etc., etc.,
Drills	Metal Stamps

Economy of time, labor and materials is the keynote of manufacturing profits.

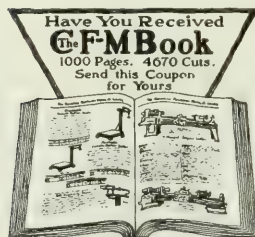
In the development of power, transmission, selection of machinery, it is of the utmost importance to secure the greatest output of work.

Even in the selection of your small tool equipment, the greatest care must be used. Remember, it is not drills but holes, that you are buying. The same applies to every tool that you buy.

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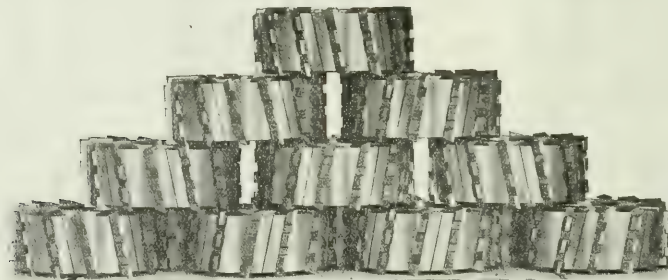




FIG. 1. VIEW OF MAIN BUILDING WITH TOOL ROOM AT LEFT. MACHINE DEPARTMENT IS AT REAR END NEXT STORAGE YARD.

Large Shell Production with Standard Machine Tools

Staff Article

Simplification of operations, their combination where possible and practicable, ample equipment for the required output, and the free use of labor saving appliances such as chucks, hoists, etc., with an equitably devised and sanely administered system of remuneration have all contributed toward the successful results obtained in a plant which in basic principles occupies a unique position in the field of industrial effort in this country.

MUCH has been written, said and done regarding the merits of special purpose versus standard types of machine tools with reference to shell production, and while in many cases the building of single operation machines of specialized design has seemed to be justified by circumstances peculiar to each case, sober reflection and careful consideration enable a strong case to be made out for the adoption of standard types of machines wherever possible. Numerous instances can be brought to mind by most readers where a judicious combination of operations with sensibly designed fixtures has enabled a gratifying output to be obtained from standard tools. Considerable success has been attained in some instances where operations have been based on this principle, and their success is all the more gratifying when it is remembered that special purpose machines have also been special price machines, the value placed on many of these tools being frequently in inverse ratio to their cost, a feature which cannot but awaken more or less bitter memories among purchasers when they figure as to what the ultimate post-war, peace-blessed, close competition may have in store for them.

Certain it is that a few lines of future

work available for the numerous plants in this country will be of such a repetitive nature as shell production, and those plants whose equipment has been based on standard machines, will undoubtedly possess a distinct advantage if they remain in the manufacturing field, while in the event of the disposal of their plant, they will have a much wider field in which to look for purchasers than will be the case with special purpose machines, allowing that the latter could find a market at all.

Standard Equipment Efficient.

That standard machine equipment is little, if any, less efficient than the spe-

cial purpose variety, is shown by the experience of the plant described herewith. Engaged in the machining of 9.2 in. shells and benefiting by an initial contract for 4.5 in. shells, the management succeeded in equipping their plant with standard machines tooled up in such a manner that the daily output exceeds 1½ shells per man. The degree to which they have carried their policy will be understood from the fact that 85 per cent. of the machines used are standard lathes and drills, and 90 per cent. of these are by one maker. The ultimate financial aspect is more marked, less than 5 per cent. of the total plant investment is sunk in special purpose tools,

which will have little or no applicability after the stoppage of shell production.

The economic value of such a policy becomes apparent when applied to the entire field of munitions manufacture. At the termination of hostilities, thousands of machines will be of scrap value only, not due to their condition, but to their design rendering them unsuited for the work then available. They must then be either broken up and sold as scrap, or, if used at all, may be much less efficient than a standard tool.

In either case, the tool depreciation which must be faced by the industry will reach a

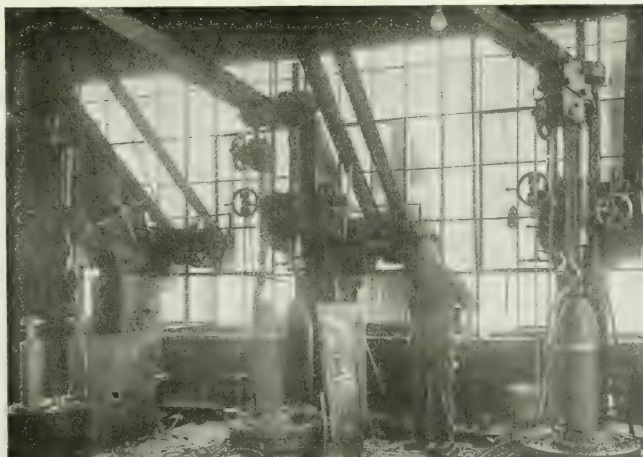


FIG. 2. DRILLING AND FACING NOSE IN HEAVY DUTY DRILLING MACHINES. DUPLEX ARBORS ARE FITTED TO THE REVOLVING TABLES.

figure formidable enough to be ranked as a national loss, which will be still further apparent if a recrudescence of legitimate manufacturing should create an ultimate demand for standard tools.

Its Ultimate Influences.

Such a development would render the

shell, the output per man is close to the maximum, while the earnings per man due to a carefully graded and wisely administered bonus system, are easily the maximum, not only for the class of shell, but for a wide radius from the plant location.

type, being a No. 2 Austin unit, adapted for rapid construction and indefinite extension and duplication, and affording, in its completed state, an abundance of daylight, fresh air, large areas of unobstructed floor space, and adaptability to the installation of shafting and machinery. The front portion is devoted to office accommodation, the overhead space in the monitor roof providing ample space for an upper suite as shown. Fire protection stations consisting of hydrant and hose house are placed at convenient intervals.

The storage yard has space for many tons of raw material, which, on entering the building, turns immediately to the left and thence along the far side for about half the building length, doubles back up the centre aisle and returns by the near side, at which point machine work is completed and the work examined prior to banding and varnishing. These latter operations take place in the forward part of the building, after which the completed work passes through final shop and Government inspection departments towards the shipping point referred to above. The building to the left of Fig. 1 is the tool room, which is separated completely from the manufacturing departments, a desirable feature not always obtainable.

Principle Operations.

In Figs. 2 to 7 are illustrated the principal operations and the type of machines employed thereon. No detailed description of the technical requirements of the shells need be given at this time; the attention of the visitor is more absorbed by the obvious simplicity of the operations, the fewness of their numbers, and the mechanical excellence of such tooling outfits as were required to adapt standard type machine tools to intensive repetition work.

Only nine operations are necessary to bring the shells to that stage where they are ready to receive the adapters and undergo the remaining operations, of which the band turning is the only strict-

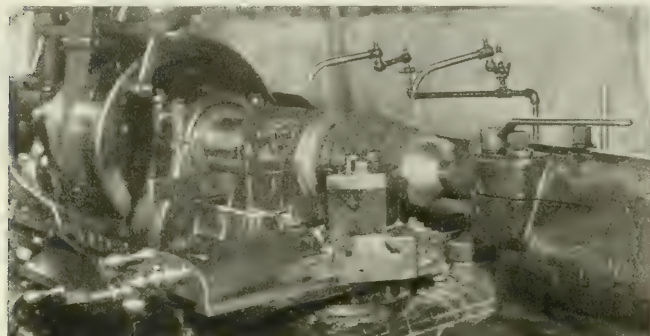


FIG. 4. ROUGH TURNING WITH EXTRA CROSS SLIDE ON REGULAR CARRIAGE. RADIUS LINK USED FOR FORMING PROFILE.

present situation doubly regrettable, as the adoption of the standard machine policy would have many potential tool builders in possession of patterns, etc., wherewith to take care of the reconstruction period looked forward to by all the manufacturing nations. Be that as it may, the present instance has fully justified the policy of its sponsors, while from the labor point of view there is quite a lot to be said in its favor. A man who has spent two or three years in a single-purpose shop may be a workman, but is not by any means a mechanic. The same time spent in a standard-tool shop might not make the man a mechanic, but the broad familiarity with general purpose machines would make him a long way more useful and adaptable to later conditions. As far as present conditions are concerned, it can be said that the percentage of spoil work has reached a minimum for this size of

In the actual laying out of the plant, every advantage was taken of free interchange of facilities and methods which had been developed by shellmakers up to that time, the 8 in. contracts, which were already in course of execution at several plants, affording numerous points for consideration. Continuous progression was, of course, a prime requisite and its adoption was greatly facilitated by the type of building and track provision. A view of the complete plant, with the exception of the storage yard and railway sidings is shown in Fig. 1, the storage yards for the forged blanks being at the extreme end of the building, while the finished product is passed directly from the bond room into freight cars on the right side of the building along which a track extends nearly the full length.

Standardized Buildings.

The building itself is of standardized

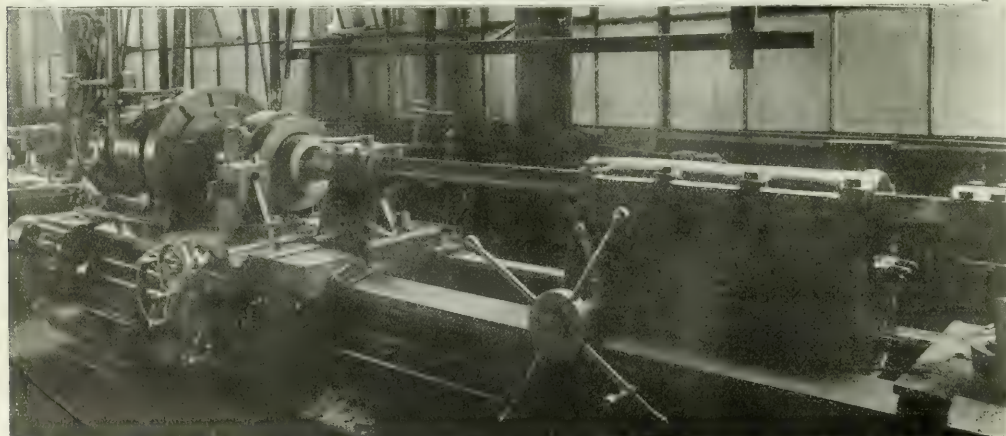


FIG. 3. MACHINING THE INTERIOR OF SHELL IN LARGE ENGINE LATHE WITH BORING TAILSTOCK AND SPECIAL CUTTING-OFF TOOL REST.

ly machining operation. Roughly outlined these are: (1), Drilling and facing the nose; (2), boring and cutting off open end; (3), re boring nose true with main bore; (4), turning exterior; (5), final boring and bevel facing of nose; (6), base recessing, etc.; (7), milling nose thread; (8), grooving and waving; (9), threading base.

Operation 1 is illustrated in Fig. 2, three Colburn heavy drills being fitted with revolving tables carrying two arbors each. The forgings are brought to these machines from the storage yard immediately outside, by two wheeled trollies, the shell being clasped round the body by a finger which is automatically controlled by the position of the handle. They are lifted onto the arbors by individual quick-acting chain blocks and a simple type of carrier. The upper ends of the arbors are fitted with beveled discs of such a diameter that they support the shell at a predetermined point of the inner nose profile. After drilling

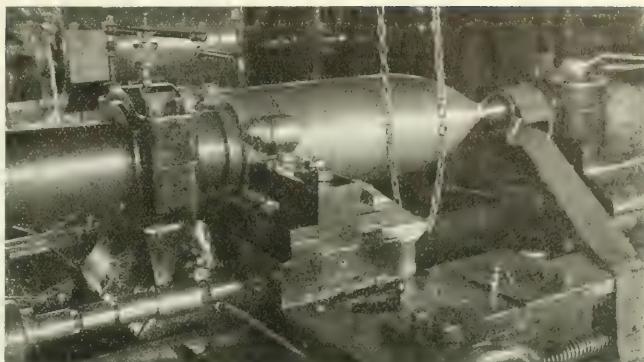


FIG. 6. STANDARD ENGINE LATHE WITH ECCENTRIC DRIVEN WAVING TOOL OPERATED THROUGH GEAR DRIVEN BY SHAFT FROM FACE PLATE.

Blond engine lathe with sufficient length of bed to accommodate the special boring tail stock and bar. This tail-

the bar. A steady head guides the bar close to the mouth of the shell being rapidly clamped and loosened to either the bed or the bar. The bar also has rapid traverse by hand.

The shell is carried in a pot chuck fastened to the regular faceplate and supported by a heavy split babbitted outer bearing. The nose of the shell centres on a tapered pilot and when being placed in position, the open end of the shell is centred by a tapered plug on the end of the boring bar. While thus held in accurate location, three driving screws are tightened up in the outer end of the pot chuck, thus insuring an even division of metal around the interior and leaving any eccentricity of forging to be removed in turning. Three interchangeable boring heads are used to complete the interior—rough boring parallel with double cutters—rough boring profile with serrated acorn cutter—finish ream complete with smooth edge acorn. Seventeen machines of this type are installed.

The small but important job of re-boring the nose hole to insure it being concentric with the main bore, operation 3, is done in a Hamilton 34 in. vertical drilling machine, with duplex arbor equipment on a revolving table similar to operation 1. In this case a pilot bush-

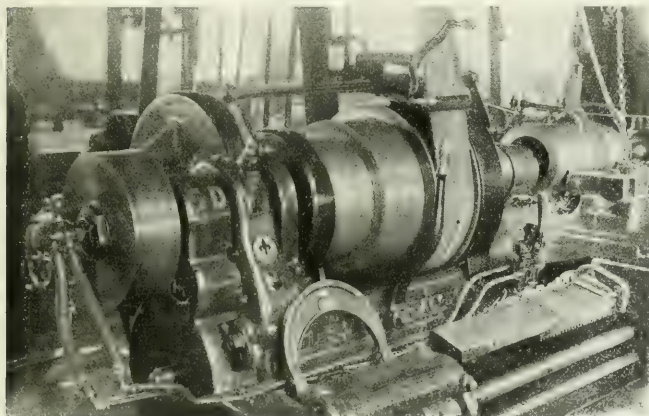


FIG. 5. FINISH TURNING LATHE SIMILARLY EQUIPPED TO FIG. 4. BUT WITH AIR CYLINDER OPERATING SIX-DOG EXPANDING ARBOR.

the nose, it is machined down to a fixed distance from the arbor disc to provide as far as possible a uniform amount of metal to be removed from the interior. The drill is started directly on the black surface and the facing tool is an ordinary double cutter of square tool steel in a stout arbor with a pilot point. The overhead tracks shown in Fig. 2 converge at the end of a runway bench on which the shells are deposited and on which they travel thereafter up to the preliminary inspection of machining. Each machine has its own chain hoist running on an individual overhead track so that the shells are lifted into and out of position by each machine operator.

Importance of Boring.

The boring of the interior is the first major operation and every care has been taken, both in type of machines and tooling outfit, to insure the highest possible degree of accuracy, finish and output. The type of machine employed is shown in Fig. 3. It is a 27 in. heavy duty Le

stock is clamped to the bed in a suitable position and has geared power feed by a pinion to a rack cut on the underside of

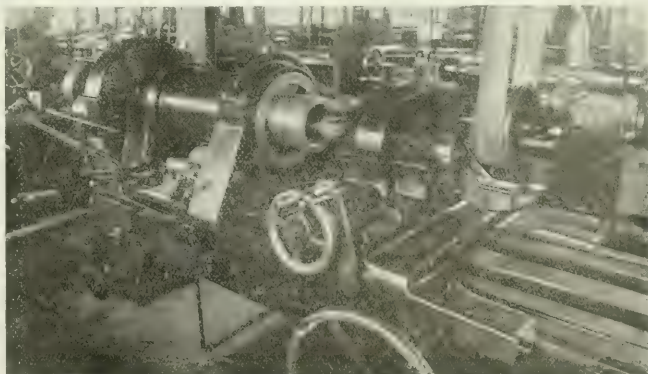


FIG. 7. MILLING THREADS IN BASE OF 9.2 IN. SHELL. MACHINE FITTED WITH AIR CHUCK, TRAVELING CARRIAGE AND TWO SPEEDS.

ing is fitted to the top of the arbor, to guide the lower end of the boring bar which carries a single point tool and takes a comparatively light cut; accuracy is the principal requirement of this operation. To insure this still more, the arbor is made of the plunger type so that as the weight of the shell causes it to descend, three smooth centring dogs are expanded out against the finished surface of the bore near its lower end, making the axes of the two bores truly coincident.

Turning in Two Stages.

The second and last major operation is the turning of the exterior. This is divided over two groups of machines, the first or roughing stage being done on fifteen 33 in. heavy duty Le Blond lathes. The shell is driven by an automatic arbor of the eccentric grooved type expanding against the finished bore. The nose is supported on a pipe centre in the tailstock. It is of interest to note that all the chuck and centre parts are made of casehardened machine steel and have given excellent service under prolonged use.

lathes with carriages similarly equipped to those just described. In Fig 5, which illustrates one of these lathes, the extra cross-slide can be seen on top of the carriage. Special driving equipment, however, is provided in the shape of air operated expanding arbors. This is clearly illustrated in Fig 5, the air cylinder, connections, and controlling valve being of M. E. C. manufacture, while the arbor consists of a special driver secured to the standard spindle nose, and fitted with six smooth driving dogs operated by tapered plug on end of rod from air cylinder. These dogs are staggered and provide the maximum number of contact points necessary to insure accurate centring of the bore, so that the finished exterior will be truly concentric.

Finishing Nose and Base.

In performing this work, operation 5, the bevel seat for fuse is first machined by a double cutter, whose limit of travel is determined by stop pins held in the same fixture as the cutters, and making contact with the curved profile of the nose, thus avoiding any necessity for

cutter used for trimming the base being provided with a filleted part to suit the required radius. Air chucks similar to those already described are fitted, the shell being positioned from the nose and driven by the body in pot chucks with outer steady.

Grooving and Waving.

Two Holden-Morgan thread millers handle the entire nose threading work, the shells then being grooved and waved, operation 8, on three 25 in. Le Blond engine lathes with special tool boxes fitted to the standard cross-slide, see Fig. 6. A right and lefthand thread feed shaft is fitted to the carriage and the rear or under cutting tool rest feeds in simultaneously with the waving tool in front. No attempt is made to form a preliminary groove or remove any metal from the portion on which the threads are formed.

The waving tool is operated by an eccentric to the right of the tool rest, the eccentric shaft being bevel driven through a lay shaft with universal joints, geared up to a rim on the face plate. This lay shaft is seen in the foreground of Fig. 6, as is also the air operated expanding arbor which drives the shell by the base. Threaded centre pins in the nose engage with the tail centre.

Base Threading.

The equipment for this, the final preliminary operation, consists of three Holden-Morgan and one Smalley-General thread millers, the latter being illustrated in Fig. 7. It is equipped with M. E. C. air-operated chuck and like the others has a quick speed and facing tool for truing up the bottom of the recess to insure accurate seating of the adapter flange.

Concluding Operations.

The remainder of the work is similar to that in the majority of other shops on the same class of work. A Root and Van der Voort adapter driving machine, West Tire Setting Co.'s banding equipment, and Root & Van der Voort band turning machines complete the mechanical equipment. Nine electric ovens bake the varnish with which the interior of the shell is sprayed, after which the necessary inspections, markings, etc., are carried out, followed by boxing and shipping.

Figs. 8 and 9 show general interiors at each end of the building, the former including the spraying and baking ovens, etc., while the latter shows the general style of arrangement, all of the transmission and accessory equipment such as Chapman ball bearings and shafting, and Herbert Morris chain hoists being of Canadian manufacture. These views also give an excellent idea of the interior construction of a modern factory building; large glass area, adaptability of steel framing to shafting and layout, disposition of radiators below side windows, and also on monitor side lights and high-power incandescent lights with diffusing globes.

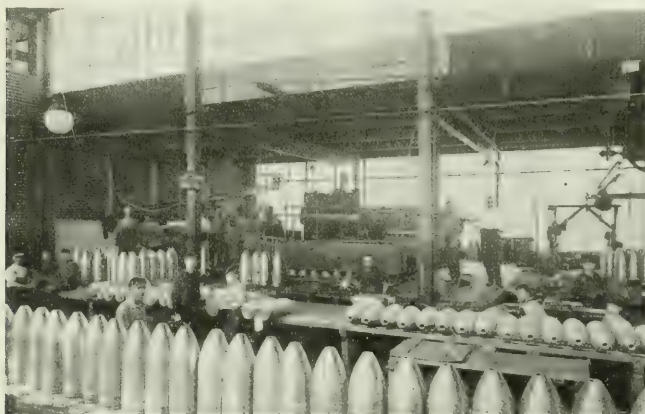


FIG. 8. FINAL OPERATIONS DEPARTMENT WHERE SHELLS ARE VARNISHED, BAKED AND INSPECTED BEFORE ACCEPTANCE BY GOVERNMENT OFFICIALS.

The standard tool slide of the carriage carries a heavy duty type of tool rest and is controlled by a radius link of the conventional type while turning the curve of the nose. An additional tool, for turning the parallel portion, is carried in a special cross-slide attached to the wings of the carriage, as shown in Fig. 4. The heavy duty imposed on these tools may be gathered from the fact that the clamping bolts on the swivel slide were not sufficient to prevent the side pressure on the tool from forcing it out of position, necessitating the fitting of round half and half dowels in the joint between the swivel slide and the cross slide. Positive stops to limit the rough turned diameter are fitted to each cross slide.

The second stage of the turning operation in which the exterior of the shell is finished to accurate size is performed in five 27 in. heavy duty Le Blond engine

locating the shell accurately in the chuck lengthwise, a proceeding which would be troublesome in view of possible variations in the overall length of the shell due to the base end being still unfinished.

The nose hole is now bored out to gauge and the countersink at bottom of threads cut by means of the crossfeed on carriage. During this operation the base end is closed with a wooden plug to retain the cutting compound which enters the shell. These machines are 21 in. heavy duty Le Blond lathes with turret rests on the carriage.

The base is now finished, operation 6, on machines similar to those used in operation 5. A tool, arranged to cut on the end of the shell, trims it to exact length, the counterbore formed for adapter flange, rags removed from newly formed edges and the radius formed on outside edge of base, the broad faced

Reference has been made to the tool room being located in a separate building. Such an arrangement is preferable

taken care of by a large milling machine. Most of the machines in the following list are shown in the illustration: one



FIG. 10. LARGE, AIRY, WELL-LIGHTED TOOL ROOM ASSISTS IN PRODUCTION OF ACCURATE WORK.

in a case like this, where the presence of a tool room in the main building interferes to a considerable extent with the layout of the path to be followed by the work. It also reduces the amount of interruption which some tool room executives suffer through being too convenient of access by the shop hands, and in the case of specialized tooling outfits like the present, the shop supplies can be well taken care of by a comparatively small tool crib in the main building. Interior view Fig. 10 shows the tool room—note the individual time clock for the men, also daylight on all sides.

Although tool room work in a shell shop is confined to a few lines of cutters, reamers, bars, etc., the equipment required is quite extensive, and capable of a wide range of jig and fixture production, the absence of a planer being

21 in. LeBlond lathe, heavy duty type; one ditto, standard; one 17 in. ditto, standard with taper attachment; one 25 in. C.M.C. standard engine lathe; one No.3 Le Blond heavy duty miller; one No. 2 Cincinnati universal miller; one 26 in. W. F. and J. Barnes vertical drill; one Allen ball bearing sensitive drill; one Leland-Gifford ditto; two No. 1 Le Blond tool room grinders; two 20 in. Bertram shapers; two hack saw machines; all driven by line shafting from one 30 horse-power Westinghouse motor.



CANADA'S EXPORTS CONTINUE TO EXPAND.

EXPORTS of Canadian produce in the first six months of the current year were valued at \$620,234,481, an increase of

\$144,778,000, or about 30 per cent. over the record total reported for the corresponding period of 1916. As compared with the corresponding period of 1914, before war requirements created an insatiable demand for everything that Canada could supply, the increase is \$472,004,000, or about 320 per cent.

Taking the preliminary figures as reported month by month from Ottawa, and completed for the half year by the June statement issued the other day, the following comparisons of six months' exports of Canadian produce on the one hand and imports entered for consumption on the other may be made for a period of six years:

6 Months.	Exports	Imports	Balance
1917	\$620,234,000	\$531,605,000 - 8	\$88,629,000
1916	475,456,000	350,104,000 +	125,352,000
1915	216,171,000	205,759,000 +	10,412,000
1914	148,230,000	256,336,000 -	112,106,000
1913	160,621,000	346,236,000 -	185,615,000
1912	139,594,000	291,871,000 -	152,277,000

The figures as given in the foregoing exclude the bullion returns, which are complicated now by special transactions having no bearing on Canadian trade, and also exclude exports of foreign produce through Canadian channels. They deal entirely with what Canada has sold abroad out of her own store and what she has purchased from abroad for her own use.

Imports Rise Sharply.

While the figures are highly satisfactory, it may again be noted that Canada is not doing as well as a year ago in respect to her balance of trade with other countries. The export gain of about 30 per cent. must be considered along with a gain of about 52 per cent. in imports. In the first six months of 1916 we established a favorable balance of about 125 millions; this year it is less by about 40 millions. While we have been speeding up our sales, with considerable benefit from high prices, we have also been buying abroad more heavily.

It is not easy to say how much of the buying has been necessary and how much could be set down to extravagance resulting from the great prosperity of the moment. Heavy buying of raw materials to go into goods which are later exported as manufactures no doubt is a large factor in the expansion of imports, but hardly the only one. It would be a matter of regret if this more rapid expansion in our purchases as compared with our sales should mean that our favorable balance has turned definitely downward for the time being.

The figures of the June statement show a considerable falling off from the high level reached in May. In the latter month there was the usual spring rush of goods which had been waiting on the opening of navigation for shipment. In June, conditions in that respect would naturally be more normal.

As compared with May, there was a falling off of about 33 millions in exports and a falling off of about 10 millions in imports. As compared with June a year ago there was a gain of about 21 millions in exports and a gain of about 31 millions in imports.



FIG. 9. INTERIOR OF MACHINE DEPARTMENT SHOWING SHAFTING ARRANGEMENT, INDIVIDUAL HOIST INSTALLATION AND LIGHTING SYSTEM.

PRODUCTION METHODS AND DEVICES

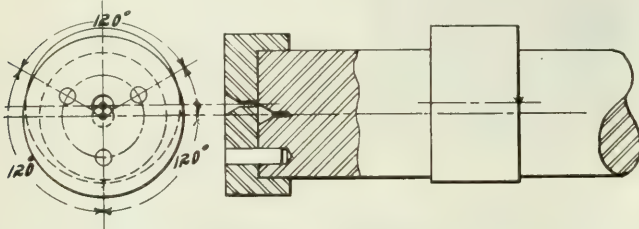
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ECCENTRIC TURNING JIG.

By R. Hamilton.

IT IS sometimes required to turn slight eccentric portions on shafts where the small throw will not permit of the two centres being placed in the end of the shaft. A convenient method is to have a cap-piece made as

remove the bush, the small plate B is first dropped in the centre and then the split bush is placed in, so that, when the cap screw E is forced in, the teeth will be likewise forced into the inner surface of the bush A, and, as the end of the screw pushes the plate B, the bush will be raised from its position.



ECCENTRIC TURNING JIG.

shown in the sketch, the eccentric centre being placed in this in the desired position. To maintain proper alignment, a small locating pin fixed in the jig enters a previously drilled hole in the end of the shaft. When two or more small eccentrics are turned on the same shaft, the jig can be made as indicated in the end sketch, which shows three equidistant holes, 120 degrees apart. These, when set with the locating pin, produce three uniform and similar eccentrics; the pin being of the slip variety.

REMOVING BLIND BUSHINGS

By S. B.

BUSHINGS are often placed in castings or fixtures in such a position that it becomes very difficult to remove them when necessary; no provision being made to back them out if desired. In the sketch herewith are illustrated two methods by which the removal of these bushings can be facilitated. The one to the left bottoms on the containing hole and offers no means of getting below the bush to eject it from its position. The simple device here shown consists of a split bush, a small plate and a suitable cap screw for jacking out the bush A. The small bush C is made of cast steel and turned to a diameter somewhat larger than the bore of the bush A, and through the centre is drilled and tapped a hole suitable to the size of the work in hand. After being tapped, the bush is given a number of serrations on the outer diameter so that the teeth inclined upwards as shown in the sketch. After removal from the lathe, the outer surface is removed with the exception of the four sections shown at D, these providing the grip that extracts the bush. After splitting the bush in two, it is hardened and made ready for use. To

Where the bush does not extend to the very bottom of the hole as shown to the right, bushes with a small flange can be used for the purpose. For convenience of entering into the hole in the bush F, the flanges only extend for a short distance as shown at J. The extracting bush is made similar to the one above-mentioned, but when placing the split bush in position, one of the sections, as at H, is placed in first, so that the shoulder will go under the bottom of bush F, and then the other half is slid down until the flange will enter, after which the cap screw is turned in after the usual manner; the plate G in this instance is placed in prior to the split bush.

DECIMAL THREAD DIMENSIONS.

By J. H. R.

IT is not often that the men in the shop are confronted with a drawing that shows the pitch of a thread to be cut to a dimension of a decimal of an inch, but once and a while the draughtsman, either from lack of forethought or an over-fondness for decimals, will represent the thread dimensions to the nearest decimal equivalent. Just recently I was requested to figure out a set of change gears to cut a thread of .07143 inch pitch, and before asking any questions, resolved this to a common frac-

tion; thus $\frac{.07143}{1} = \frac{7143}{100,000}$ equals

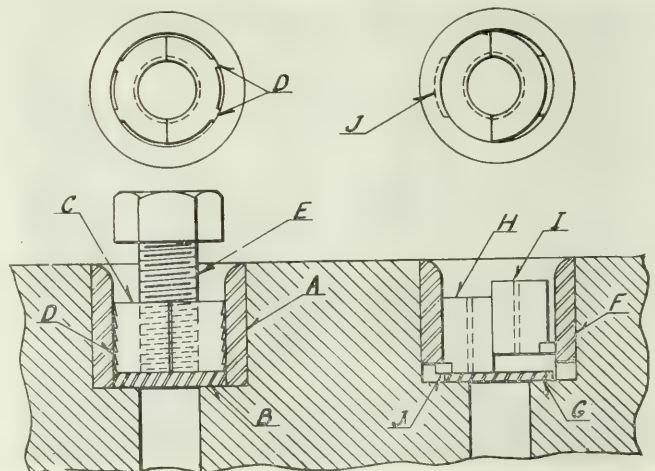
13.9997, or practically 14 threads per inch, which proved to be the size required, the value .07143 being the decimal equivalent for 1/14 of an inch. The calculation for the change gears was then easy, the ratio being 4 to 14 on a lathe with a 1/4 inch pitch lead screw. The wheels required would then be in the following proportion.

With 28 on the spindle, the lead screw gear would be $\frac{28}{4} \times \frac{14}{1}$ equals 98 teeth.

REVERSING THE TOOL TO ELIMINATE CHATTER.

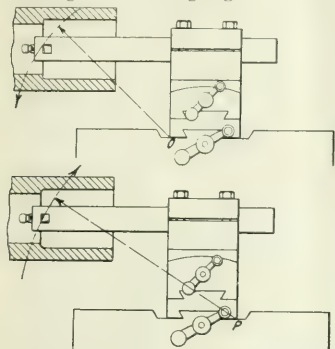
By J. H. R.

OWING to the excessive overhang that is often required on lathe tools in the operation of boring holes, chatter may prove to be a troublesome feature. This is



REMOVING BLIND BUSHINGS.

largely due to the position of the cutting tool, in relation to the heel of the tool support, or in other words, the fulcrum point upon which the component parts hinge has a tendency to tilt; this action resulting in the cutting edge of the tool



REVERSING TOOL TO ELIMINATE CHATTER.

springing in the path of the arc indicated in the sketch. When the tool is set in the ordinary manner, with the cutting edge upwards, the centre of this arc will be at O in the top sketch, while with the tool reversed, the fulcrum will be on the opposite side as indicated at P in the lower sketch. These changes of position are based on the supposition that with the exception of the cross slide, the bar and post are rigid, therefore, with the cutting edge upwards, the tendency to dig-in is much greater than when the tool is reversed.

Another advantage that may be accorded an inverted boring tool—especially on an old lathe where play may have developed in the front bearing is that the spindle will be held down on the bearing, thus making the cut more steady. When the bearings are a little loose, the tool with the cutting edge upwards often has to support the weight of the work and spindle, in addition to the cutting of the metal. The inverted tool may often be used to advantage on other classes of work where difficulties sometimes arise through unknown or apparently unsolvable causes.

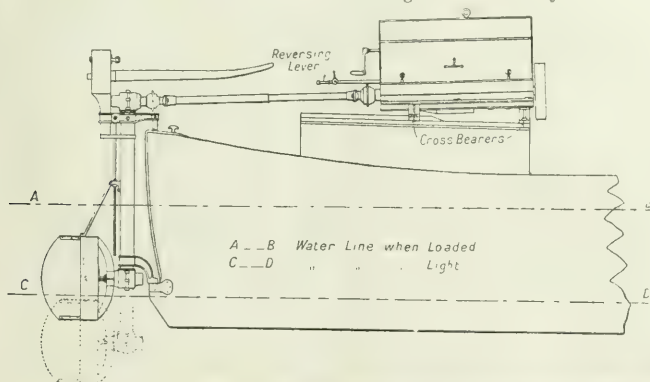


FIG. 1. STERN OF BARGE SHOWING DETACHABLE MOTOR INSTALLATION.

DEVELOPMENTS IN CANAL BARGE PROPULSION IN BRITAIN

CONSIDERABLE interest has been displayed during recent months in an application of detachable motors to canal barges by a firm of English coal dealers. Experiments were commenced about a year ago and results have been so satisfactory that recently a special demonstration was made from Birmingham to London, a distance of 150 miles, with one barge in tow. The two boats carried approximately 25 tons of cargo each, and the trip was made at the rate of 2 miles per gallon, of paraffin. The total time taken was 64¼ hours, which also included passing through 144 locks en route.

The design as shown in Fig 1, is based on the familiar row-boat motor, with certain constructional changes and modifications rendered necessary by the increased power and weight. In this case the motor is carried on a suitable channel iron frame which is permanently attached to the top of the cabin, and is duplicated in all of the barges on which the system is applied. The propeller gear proper is supported by two stout brackets at top and bottom of a tubular casing, these brackets carrying the pintles which fit into sockets in the stern of the boat in the same manner as an ordinary rudder. The upper pintle bracket extends outward to support a wooden socket pin into which the tiller is fitted, so that the propeller and gear are swung round as the tiller is operated to change the course.

Draft Variation

An important modification of the gear rendered necessary by canal freight conditions is the adjustment for variations of draft. As shown in Fig. 1, the decrease in draft when light causes the



FIG. 3. TELESCOPIC DRIVING SHAFT.

propeller to be almost out of water and telescopic construction of the vertical shaft is necessary to allow of it being submerged as shown by dotted lines.

This is done by attaching the propeller shaft bearing bracket to a tube which extends up inside the full length of the tubular casing so that at no time is

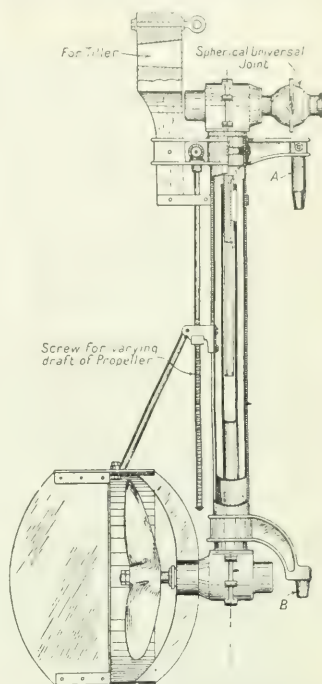


FIG. 2. DETAIL OF PROPELLING GEAR.

its upper end liable to be under water. A slot on the rear side of the casing enables a bracket to be attached to this

inner tube so that by means of a bevel operated screw shaft, the propeller can be adjusted to the desired draft. See Fig. 2.

The propeller is surrounded by a circular casing which is flanked on each side by a rudder blade, this duplex rudder, combined with the swivelling of the propeller, making the barge very sensitive to control. The overhang of the propeller and rudder is supported from the adjusting bracket by a diagonal stay as shown in the illustrations, so that the propeller shaft bearing bracket is relieved from this excess weight. The vertical shaft is of corresponding telescopic construction, the solid member being splined to suit the feather key secured in the hollow member. Bevel gears connect the various shafts, the horizontal shaft in the upper casing being connected to the engine by another telescopic shaft, fitted with a universal joint at each end to allow full play horizontally and vertically to the propeller gear.

Rapid Demountability

By removing four bolts, this drive shaft is removable; other six bolts release the engine from its frame, and the propeller gear lifts clear out of the pintle sockets, enabling the transfer of the entire plant from one barge to another to be effected in less than fifteen minutes. The engine employed in these trials is a Sterling 4-cylinder marine type, developing 17 brake horse-power at 600 revs. per min., reduced to 425 revs. per min. for the three-bladed 22 in. dia. by 18 in. pitch propeller.

The engine, complete with its casing, self-contained fuel tanks, and flexible pipes for circulating water, weighs 672 lbs., and the propeller gear 280 lbs., and are transferred by a small hand derrick which fits into a socket on the side of the cabin on each barge, the derrick accompanying the plant.

It will be noted that the design allows for considerable variation in cabin height and location, depth of hull, etc., the only dimension calling for duplication being the position of the pintle sockets. Apart from these, however, there is sufficient latitude to enable quite a number of different boats being adapted for use with one power plant at a minimum cost.

Efficiency Cost

The total load capacity is 100 tons when towing two barges. The engine is started on gasoline, but is run on paraffin with a slight mixture of spirit substitute, the average cost working out a less than one cent per ton mile.

USES OF CHINA WOOD OIL

By D. Street

The principal use of wood oil in China is for oiling or varnishing the vast number of junks and boats in that country, but apart from that it is universally used to varnish nearly everything of a wooden nature to preserve the wood and to give it a polish. The Tung Tree, which bears the fruit, from the nuts of which the wood oil is produced, grows freely in China in the Provinces of Szechuan, Kweichow, Hunan, and Hupeh, and the percentage which each province contributes to the total production of wood oil in this area, for which Hankow is the final distributing centres is 35, 25, 25, and 15 per cent., respectively. The Tung tree flowers in April and the resultant fruit matures in the middle of October. The external appearance of the fruit resembles that of a large hickory nut. It has a heavy outside shell or husk, measuring from 1½ to 2 in. in diameter, which contains from three to five nuts each of which is covered with a thin shell. The meat in these nuts produces the oil, and it is called wood oil in China, because it is applied to wood.

The oil is used chiefly by paint, varnish and linoleum manufacturers, but it is also extensively replacing linseed oil for other purposes, the extent of its use depending largely upon its market value, compared with that of linseed oil, though in later years it has for certain varnishes and linoleums established an inde-

pendent position, irrespective of price. Its principal characteristic and value as a commercial product is its high drying properties, and this fact makes it indispensable in certain lines of manufacture and thus its use is constantly increasing.



ONE WORKS ONE PRODUCT

By O. C.

THE movement initiated by the Association of British Machine Tool Makers for a greater degree of specialization among machine tool builders is one that will be followed with the closest attention by all who are interested in the evolution of industry. It is reported that ten machine tool firms have arranged among them-

FALL IN!

What will you look, sonny, what will you look

When the girls line up on the street,
Shouting their love to the lads come back

From the foe they rushed to beat?
Will you send a strangled cheer to the sky

And grin till your cheeks are red?
But what will you look when your mate

goes by
With a girl who cuts you dead?

Where will you look, sonny, where will you look

When your children yet to be
Clamor to learn of the part you took

In the war that kept men free?
Will you say it was naught to you if

France
Stood up to her foe or bunked?

But where will you look when they give
the glance

That tells you they know you finked?

How will you fare, sonny, how will you fare

In the far-off winter night,
When you sit by the fire in an old man's

chair
And your neighbors talk of the fight?

Will you sink away, as it were from a
blow,

Your old head shamed and bent?
Or say—"I was not with the first to go,

But I went, thank God, I went?"

Why do they call, sonny, why do they call

For men who are brave and strong?
Is it naught to you if your country fall,

And Right is smashed by Wrong?
Is it football still and the picture show,

The bar and the betting odds,
When your brothers stand to the tyrant's

blow
And country's call is God's?

—Harold Begbie.

selves that each shall devote itself to the production of a single type of machine. One will confine itself to drilling machines, another to planers, another to lathes, another to boring mills, and so on. Beyond all question such an arrangement will prove enormously more economical and efficient than the state of affairs under which each one of a score of firms sets itself out to supply any and every machine in the whole gamut of machine-tool production. Besides reducing to manageable proportions the number of patterns and drawings to be kept, such a policy permits of the production of machine tools being placed upon a manufacturing instead of a "jobbing order" basis, and enables the maker to concentrate all his effort and talent upon the improvement of his one line of product.

There is some loss due to the narrowing

of experience and practice, which perhaps checks to some degree the application of improved methods or designs arrived at in the making of others, but that can be overcome by specialist makers keeping themselves well informed upon developments in the industry generally, and by the provision of increased facilities for the interchange of ideas among the specializing firms. The arrangement also lends itself to the appointment of group publicity agents and travellers, both at home and abroad. The doing of foreign trade through the medium of independent general agents has on the whole proved far from satisfactory, but hitherto the majority of machine tool-makers have had to rest content with that means for the reason that their turnover was not large enough to bear the expense of sending a special agent to the leading foreign centres, much less of keeping one there permanently; whilst it has not been easy for a group of firms which were all competitors in certain products to combine for the establishment of joint foreign agencies.

Under the system of specialization by group-compact, these difficulties disappear, and it is understood that the better organization of foreign publicity and sale is one of the chief objects of the new project. The one-product works is by no means unknown in Britain, and is almost a commonplace in America, but this appears to the first time that the policy of one-product specialization has been adopted in concert by a group of firms, for the furtherance of group interests.



THERE is a certain steel firm operating on a very large scale where the owner has the habit of sending off his departmental executives for a holiday at a moment's notice. He pays railways fares and full salary whilst these folk are enjoying themselves, but the rigid condition is laid down that the man must go away at once. The object of course is to discover whether the executive head has trained up an efficient understudy, whether he has arranged for open records of his work or has tried to keep affairs to himself. This sudden compulsory holiday brings this and other important facts to light in a very unmistakable fashion.



A GROWING practice is noted in foundries to paint the pattern so as to indicate the parts of a casting which are to be machined and the parts which are to be left rough. The point is that castings are sometimes spoiled because the moulder does not always know which part is to be finished in the machine shop. The parts of a pattern corresponding to parts requiring no machine work are painted grey, whilst the parts which are to be machined are painted yellow, with the parts of the pattern indicating the location of cores in red. Coloured cards are sometimes used for each pattern, for the use of the pattern-makes and sometimes for the moulder, with the result that fewer castings have been ruined on account of their being gated wrong than was formerly the case.

Test Data Relative to Uniflow Steam Traction Engines*

By F. W. Marquis

This paper presents the results of two series of tests of Baker uniflow steam traction engines, many of them being shown graphically in the form of curves. The steam consumption of these engines is compared with those representative of the holder or counterflow type of prime movers, and the conclusion is reached that the simple uniflow engine operating non-condensing with saturated steam has a lower steam consumption than the compound counterflow engine under like conditions and that, when operating non-condensing but with superheated steam, it will have approximately the same steam consumption as a compound counterflow engine when condensing and using saturated steam.

AT FIRST thought it seems strange to find refinements such as the uniflow cylinder and the superheater in connection with traction engines; but when it is remembered that the latter are used extensively in certain districts where fuel is very expensive, and water has to be hauled many miles, the reason for taking advantage of every means for reducing coal and water consumption becomes readily apparent.

Efficiency tests covering uniflow steam traction engines made by the A. D. Baker Co., Swanton, Ohio, have been carried out on two occasions, the first during the year 1915, and the second during 1916. The engine tested in the latter year was almost identical with that tested during 1915, the exceptions being that the 1916 boiler was supplied with a smokebox type of superheater, and its water heating surface was 24½ per cent. greater; in addition the 1916 engine piston displacement showed an increase of 8½ per cent. Both engines were of the makers' standard designs except for the uniflow cylinder and superheater, which were then in process of development. The principal dimensions of both engines are given in Table 1, and besides the uniflow cylinder and the superheater, a feature of particular interest is that of the valve gear, a description of same being included.

Figs. 1 and 2 show cross sections through the uniflow cylinder and valves. As well as triple ported admission valves there is an auxiliary exhaust valve which

late in the stroke, instead of at the point where the piston covers the main exhaust ports as is the case with uniflow engines not provided with some form of auxiliary exhaust valve.

Valve Operation

The operation of the valves can best be explained by following their movement as the piston moves through one stroke. Suppose the piston to be moving towards the right and nearing the end of its stroke; that is, that it is just a little to the left of its position in Fig. 1. The admission valves (at the top) will then be a little to the right of the position shown, and moving towards the left. The auxiliary exhaust valve F (at the bottom of the figure) will be at the extreme right end of its travel, and stationary.

When the edge J of the piston uncovers the ports at the centre of the cylinder, exhaust commences. About the same time the cavity A in the admission valve uncovers the port at the end of passage B and allows live steam to flow from E (see Fig. 2), through passage B, cavity A and passage D into chamber N at the end of auxiliary exhaust valve F. This causes valve F to

Exhaust is then taking place both through the main exhaust ports and through exhaust port K'. An instant after, the auxiliary exhaust valve moves and just before the piston reaches the end of its stroke, admission takes place through the three ports C.

As the piston starts on the return stroke towards the left, exhaust takes place through the main exhaust ports at the centre of the cylinder until, early in the return stroke, they are covered by the piston. The steam still in the cylinder continues to exhaust through auxiliary exhaust port K, until the piston covers this port, late in the stroke, when compression starts. Meanwhile live steam has been admitted on the other side of the piston until the admission valve has returned and cut-off has occurred. After cut-off and during expansion, the live steam in chamber N, at the head of the auxiliary exhaust valve, is free to expand through passage L and do work on the piston. This passage L enters the auxiliary exhaust valve chamber at such a point that when the valve is thrown some steam is trapped between it and the end of the valve chamber, thus cushioning it and preventing pounding.

The admission valves are driven by a

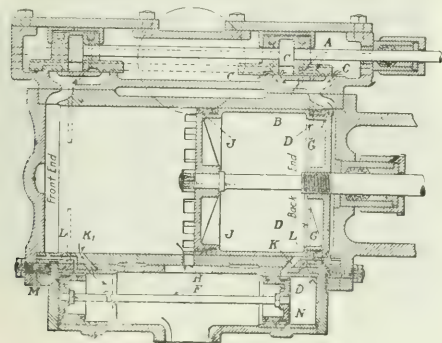


FIG. 1. BAKER UNIFLOW CYLINDER AND VALVES.

	Engine used in 1915	Engine used in 1916
ENGINE		
Nominal horsepower	16	18
Nominal r.p.m.	240	240
	In.	In.
Diameter of cylinder	8 1/2	9 1/2
Stroke	19 1/2	19
Diameter of piston rod	1 1/2	1 1/2
Diameter of flywheel	36	38
Face of flywheel	10	11
Diameter of crankshaft	3	3 1/2
Length of crankshaft	5 1/2	6 1/2
Diameter of crankpin	2 1/2	2 1/2
BOILER		
Number of tubes	49	54
	In.	In.
Outside diameter of barrel	29	32
Length of firebox	36	41
Width of firebox	23 1/2	25
Diameter of tubes	2	2
Length of tubes	75	72
	Sq. ft.	Sq. ft.
Grate area	5.56	6.94
Firebox heating surface	23.6	29.1
Tube heating surface	133.2	153.6
Total water heating surface	146.8	182.7
Superheater heating surface		47

TABLE 1. PRINCIPAL DIMENSIONS OF BAKER UNIFLOW TRACTION ENGINES.

causes the point of compression to come

move to the extreme left of its travel, closing the auxiliary exhaust port K and opening the auxiliary exhaust port K'.

Baker valve gear, which is very similar to the Baker gear now being used extensively in locomotive practice. It is a

*From a paper read before the American Society of Mechanical Engineers.

and that in the admission line of the diagrams with the later cut-off, is caused by the steam flowing into the auxiliary exhaust-valve chamber, at the instant the

with superheated steam, was only from 29 to 19 lbs., or 10 lbs.

It will be noticed that at each boiler pressure tests were run with cut-offs

under 125 lbs. boiler pressure would be 45 hp. Tests were run from about 30 to about 60 i.h.p. or from about 60 per cent. to 130 per cent. of this rated load, and

TABLE 2. SUMMARY OF ENGINE RESULTS.

Laboratory symbol	Length of test, min.	R.p.m.	Boiler pressure, lb. per sq. in. gage	Super heat, deg. Fahr.	Avg. cut-off, per cent. of stroke	1 hp	10 hp	Mech. eff.	Wt. of dry steam per h.p. per hr.	Wt. of dry steam per b.h.p. per hr.	Eff. ratio based on i.h.p.	percent
1	2	3	4	5	6	7	8	9	10	11	12	
SERIES OF 1915												
1-125-1	300	246 9	125 6	0	15 1	30 75	27 8	90 4	27 65	30 55	55 9	
2-125-3	240	252 3	125 2	0	31 7	47 38	42 8	90 4	26 45	29 25	58 3	
3-125-5	180	258 3	125 0	0	48 9	59 80	54 3	90 9	28 95	31 92	53 7	
4-140-1	240	247 6	141 5	0	15 1	37 38	32 9	87 4	25 45	29 15	58 5	
5-140-3	180	269 5	139 5	0	37 1	58 48	52 2	89 4	26 00	28 00	60 0	
6-140-2	210	263 6	140 7	0	23 3	47 95	42 0	87 7	24 80	28 25	59 7	
7-140-5	180	242 0	140 3	0	49 0	68 01	61 2	90 1	28 55	31 75	51 3	
8-155-1	240	258 0	155 6	0	15 1	45 82	37 8	82 6	23 35	28 25	61 3	
9-155-3	180	254 6	154 7	0	28 1	61 62	56 7	87 6	24 35	28 50	57 6	
10-155-2	240	260 0	155 0	0	20 4	55 63	46 4	83 4	23 72	28 77	60 4	
11-165-3	180	253 7	165 2	0	28 1	70 00	61 6	88 0	24 40	27 73	57 3	
12-165-1	210	260 5	165 0	0	12 0	45 36	39 9	86 1	25 18	29 24	55 8	
13-165-2	180	270 0	165 2	0	20 4	59 04	51 8	87 8	25 18	29 24	55 8	
14-175-1	210	251 7	175 2	0	12 0	48 83	42 7	87 5	24 40	27 90	56 0	
15-175-2	180	256 4	175 3	0	20 4	60 93	54 8	90 1	23 32	25 90	59 1	
16-175-3	180	258 7	176 4	0	2 1	74 12	66 6	89 8	26 80	28 25	58 3	
17-175-0	60	244 9	176 2	0	6 2	33 98	28 0	92 5	28 95	32 65	51 2	
SERIES OF 1916												
1-160-3	180	238 5	160 0	124	30 6	61 80	55 9	90 8	19 6	21 6	66 0	
2-160-4	180	226 0	160 0	124	40 8	64 90	60 8	95 2	21 2	22 7	60 0	
3-160-2	180	232 1	159 5	115	21 3	46 50	42 8	91 5	20 4	22 4	63 0	
4-180-1	240	255 0	180 0	115	16 7	39 30	34 2	87 0	20 4	23 4	61 5	
5-180-2	240	243 0	178 5	117	21 3	57 30	53 3	93 1	20 0	21 5	62 7	
6-180-3	180	245 0	178 3	123	30 6	61 80	55 9	91 8	19 0	20 6	65 4	
7-180-4	180	227 0	179 5	136	41 8	79 30	73 3	92 5	20 1	21 6	61 4	
8-180-5	180	240 2	180 3	142	50 8	77 90	74 0	95 0	21 7	22 8	60 0	
9-180-5	180	253 8	177 4	157	50 5	94 10	87 0	97 5	20 5	22 2	59 2	
10-180-3	60	232 3	178 6	131	30 6	73 40	67 6	92 2	19 6	21 3	62 5	
11-180-3	60	230 1	180 0	118	30 6	72 30	66 2	94 3	18 2	19 3	67 6	
12-180-3	15	257 0	180 0	127	30 6	71 30	61 1	92 8				
13-180-3	30	294 6	181 0	181	74 7	108 70	102 8	94 5	23 5	24 5	58 5	
14-180-2	180	240 8	179 3	8	21 3	52 60	49 4	93 7	20 7	28 1	56 9	
15-180-3	180	245 0	179 0	0	30 6	87 60	84 7	95 8	24 7	25 8	55 2	
16-180-4	120	245 0	175 8	0	41 8	79 20	74 0	93 7	25 7	27 2	50 3	
17-180-3	180	238 0	178 7	0	30 6	86 00	82 8	94 8	24 7	25 7	56 6	

Column 1: Laboratory Symbol. The first term represents the number of run; the second the approximate boiler pressure and the last the position of the reverse lever upon its quadrant expressed in notches from the center back.

Column 12: Efficiency ratio based on i.h.p. This is the ratio between the thermal efficiency of the engine and the thermal efficiency of a perfect engine operating on the Rankine complete expansion cycle. It is equal to $2545 \cdot WH$, where W = actual wt. of steam per i.h.p.-hr., and H = the adiabatic heat drop from pressure and quality of steam furnished to engine to exhaust pressure.

† Valve setting changed between runs No. 8 and No. 9.

Runs No. 10, No. 11, and No. 12 are short variable-speed runs. Run No. 13 is a short maximum-power run.

piston uncovers the port leading to this chamber.

The curves in Fig. 9 show the relation between steam consumption in pounds per i. h.p.-hr. and i.h.p. for both the series of 1915 and the series of 1916, under the different conditions of running. Reference to this figure shows that the highest steam consumption obtained was just under 29 lbs., which occurred at 125 lbs. boiler pressure with saturated steam and at approximately 60 i.h.p. The lowest steam consumption obtained in any single test was 18.2 lbs. per i. h.p.-hr., in the series of 1916, with 180 lbs. boiler pressure and 118 degs. superheat, at about 72 i.h.p. Reference to the curve shows, however, that this point was abnormally low, the lowest point on the curve being 19.1 lbs. per i.h.p. per hour.

The total range of steam consumption, from the most unfavorable conditions of high overload and low boiler pressure (125 lbs.) with saturated steam, to the most favorable conditions of economical load and high boiler pressure (180 lbs.)

considerably later than the most economical. It seems reasonable to assume that the engine should be rated at approximately the point of best economy. On this basis the rating when operating

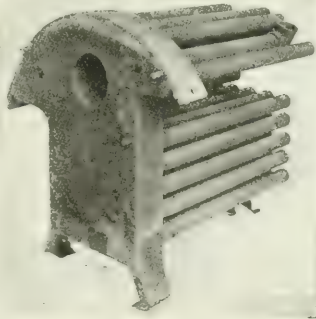


FIG. 6. SUPERHEATER REMOVED FROM BOILER.

TABLE 3. SUMMARY OF BOILER AND OVER-ALL RESULTS.

Laboratory symbol	Length of test, min.	Boiler pressure, lb. per sq. in. gage	Super heat, deg. Fahr.	Pounds of coal fired per sq. ft. of grate surface per hr.	Equiv. evapn. per sq. ft. of grate surface per hr.	Equiv. evapn. per lb. of coal fired	Eff. ratio based on i.h.p.	Wt. of air-dry coal per b.h.p. per hr.	Over all efficiency, percent
1	2	3	4	5	6	7	8	9	10
SERIES OF 1915									
1-125-1	300	125 6	0	22 2	7 82	8 38	57 1	4 67	2 85
2-125-3	240	125 2	0	32 0	11 00	8 45	57 5	4 35	4 10
3-125-5	180	125 0	0	46 1	15 25	8 11	55 2	4 94	3 63
4-140-1	240	141 5	0	25 1	8 59	8 41	57 4	4 45	4 02
5-140-3	180	139 5	0	30 6	12 97	8 02	56 6	4 41	4 04
6-140-2	210	140 7	0	31 6	10 60	8 26	56 3	4 36	4 11
7-140-5	180	140 3	0	33 6	16 90	7 77	52 8	5 10	3 52
8-155-1	240	155 6	0	27 7	9 63	8 46	57 6	4 28	4 18
9-155-3	180	154 7	0	45 0	14 10	7 83	53 3	4 58	3 92
10-155-2	240	155 0	0	36 2	11 61	7 96	54 4	4 53	3 94
11-165-3	180	165 2	0	43 9	14 89	7 57	51 5	4 58	3 90
12-165-1	210	165 0	0	38 1	10 10	7 84	53 4	4 74	3 77
13-165-2	180	165 2	0	38 1					4 17
14-175-1	210	176 2	0	33 0	10 50	7 88	53 6	4 51	3 96
15-175-2	180	175 3	0	39 7	12 40	7 74	52 6	4 23	4 25
16-175-3	180	176 4	0	49 6	15 20	7 58	51 7	4 44	4 14
17-175-0	60	176 2	0	21 3	8 72	8 87	60 3	4 34	4 04
SERIES OF 1916									
1-160-3	140	160 0	124	27 1	8 12	6 92	8 43	58 6	3 40
2-160-4	140	160 0	130	32 6	9 13	7 90	7 95	55 3	3 76
3-160-2	140	159 5	115	22 1	6 47	5 54	8 34	57 9	3 34
4-180-1	240	180 0	115	18 5	5 47	4 68	8 47	58 8	3 73
5-180-2	240	178 5	117	26 6	7 71	6 62	8 36	58 0	3 42
6-180-3	180	178 3	123	31 3	9 13	7 90	8 45	58 7	3 23
7-180-4	180	179 5	136	37 2	10 65	9 14	8 16	56 7	3 51
8-180-5	180	158 4	142	38 8	11 26	9 56	8 27	57 5	3 62
9-180-5	180	177 4	157	45 3	12 40	11 04	8 18	56 8	3 30
10-180-3	60	178 6	131	32 8	9 60	8 23	8 35	58 0	3 35
11-180-3	60	180 0	118	29 9	8 74	7 49	8 48	58 9	3 28
12-180-3	15	180 0	127						
13-180-8	30	181 0	181	62 6	16 77	14 72	7 20	50 0	4 58
14-180-2	140	179 1	0	26 9	8 71	8 24	57 2	3 83	4 77
15-180-3	180	179 0	0	36 6	11 15	7 97	56 4	3 92	4 64
16-180-4	120	178 5	0	42 8	13 38	7 36	51 4	4 50	4 06
17-180-3	180	178 7	0	35 4	10 80	8 18	56 8	3 86	4 73

Column 1: Laboratory Symbol. The first term represents the number of run; the second the approximate boiler pressure, and the last the position of the reverse lever upon its quadrant expressed in notches from the center back.

Columns 16 and 17: The superheater, when used, is considered to be a part of the boiler.

Column 10: Overall Efficiency. The ratio between the heat equivalent of the work done at the brake pulley per lb. of air-dry coal fired and the heat value per lb. of air-dry coal.

over this range the variation in steam consumption was from approximately 29 to 26½, or only about 2½ lbs.

If the same reasoning is followed in connection with the tests run at 180 lbs. boiler pressure and with superheated steam, it will be found that tests were run over a range of from approximately 55 per cent. to 145 per cent. of full load, and that the maximum difference in steam consumption over this rather wide range was only from approximately 20½ to 23½ lbs., or 3 lbs.

It is interesting to note that the maximum power obtained was 108.7 i.h.p. (102.8 b.h.p.), which was obtained with 180 lbs. boiler pressure and with 181 degs. Fahr. superheat, and with a steam consumption of only 23.5 lbs. per i.h.p. per hour (24.5 lbs. per b.h.p. per hour). This becomes particularly interesting when it is remembered that the cylinder diameter and stroke of this engine were only 9½ in. and 10 in. respectively.

The curves in Fig. 10 show the relation between steam consumption and

boiler pressure. As the boiler pressure increases, not only does the steam consumption decrease, but also the power at any cut-off, and the power at which

that there would be the same amount of coal on the grates at the end as at the beginning of a run.

It will be noted that the highest coal consumption was 5.1 lbs. per b.h.p.-hr., and that this occurred at 140 lbs. boiler pressure and 61 b.h.p., while the lowest coal consumption obtained in any single test was 2.98 lbs. per b.h.p.-hr., which occurred at 180 lbs. boiler pressure, 118 degs. Fahr. superheat, and 68 b.h.p. However, this seems to be an abnormally low value, the lowest point on any curve being 3.27 lbs., corresponding to 180 lbs. boiler pressure with superheated steam and at 67.5 b.h.p.

As a matter of interest from a comparative point of view, the steam consumption curves of a number of the ordinary counterflow type of steam engines, both simple and compound, non-condensing and condensing, have been plotted on the same sheet with certain of the steam-consumption curves of the Baker uniflow engine. These curves are given in Fig. 12. Information concerning each of the engines whose steam-

Curve C.—Simple, slide-valve engine, cylinder 15 in. by 14 in., initial steam pressure 115 lbs. gauge, non-condensing, and at 225 r.p.m.

Curve D.—Same engine as in case of Curve C, but operating condensing.

Curve E.—Cross-compound, slide-valve engine, cylinders 7 in. and 13 in. by 10 in., initial steam pressure 150 lbs. gauge, non-condensing, and at 310 r.p.m.

Curve F.—Same engine as in case of curve E, but operating condensing.

Curve H.—Tandem-compound, slide-valve engine, cylinders 8½ in. and 13½ in. by 12 in., initial steam pressure 115 lbs. gauge, condensing, and at 280 r.p.m.

Curve G.—Simple uniflow engine, cylinder 8½ in. by 10 ¼ in., initial steam pressure 125 lbs. gauge, non-condensing, and at 250 r.p.m.

Curve I.—Same engine as in case of curve G, but with 175 lbs. gauge boiler pressure.

Curve K.—Simple uniflow engine, cylinder 9½ in. by 10 in., initial steam pressure 180 lbs. gauge, superheat approximately 130 degs. Fahr., non-con-

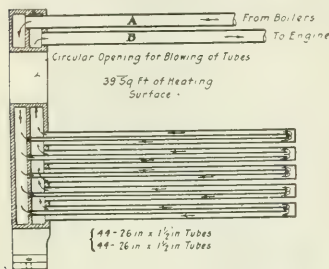
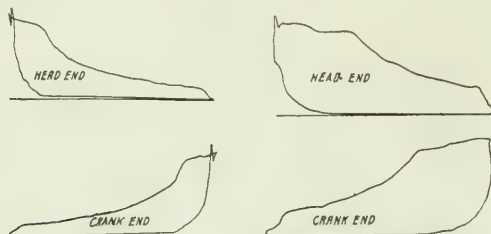


FIG. 7. DIAGRAM OF SUPERHEATER.

the lowest steam consumption occurs increases. Curve A shows the decrease in steam consumption with increase of boiler pressure at 50 i.h.p., and curve B at 60 i.h.p. Curve C shows the relation between the minimum steam consumption at each boiler pressure, and the boiler pressure. The power corresponding to minimum steam consumption at



Run No. 1. Series of 1915, 125 lb. Boiler Pressure, Saturated Steam. Run No. 7. Series of 1916, 180 lb. Boiler Pressure, Superheated Steam.

FIG. 8. SAMPLES OF INDICATOR DIAGRAMS.

each pressure is shown by the figure near each point through which this curve is drawn. It will be noticed that, with the exception of one point on this curve, the power of minimum steam consumption increases as the boiler pressure increases.

Curve A shows that at 50 hp. the steam consumption decreases from 29 at 125 lbs. to 23.4 lbs. at 175 lbs. pressure, while curve C shows that, if the point of minimum steam consumption at each boiler pressure is taken, the decrease is only from 26.4 lbs. at 125 lbs. pressure to 23.3 lbs. at 175 lbs. pressure.

The curves of Fig. 11 show the relation between the pounds of coal used per brake horsepower per hour and the brake horsepower developed. These curves are naturally of the same general shape as those given in Fig. 9, showing the relation between steam consumption and indicated horsepower. The inconsistency in results shown by the fact that many points are not located on the curves is caused largely by the facts that it was not possible to maintain uniform conditions of combustion during the different tests, and that it was very difficult to keep the condition of the fuel bed such

consumption curve is given in this figure will be found below:—

Curve A.—Simple, slide-valve engine, cylinder 8 in. by 12 in., initial steam pressure 130 lbs. gauge, non-condensing, and at 200 r.p.m.

Curve B.—Simple, slide-valve engine,

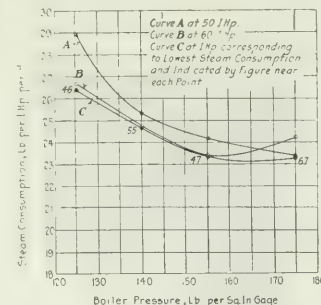


FIG. 10. CURVES SHOWING RELATION BETWEEN STEAM CONSUMPTION AND BOILER PRESSURE, SERIES OF 1915.

cylinder 9 in. by 12 in., initial steam pressure 140 lbs. gauge, non-condensing, and at 290 r.p.m.

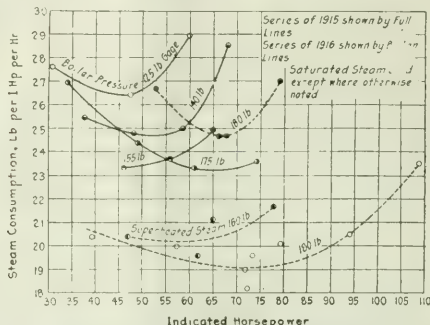


FIG. 9. CURVES SHOWING RELATION BETWEEN STEAM CONSUMPTION AND INDICATED HORSE POWER.

condensing, and at approximately 240 r.p.m.

Comparisons and Conclusions

It will be seen that the uniflow-engine curves selected are those representing the poorest and the best results obtained with saturated steam, and the best results obtained with superheated steam. A study of this set of curves (Fig. 12), shows that the poorest results obtained with the uniflow engine, namely, those of curve G, obtained with saturated steam at 125 lbs. pressure, are better than the best results obtained with any of the simple engines, even when operating condensing, and almost the same as those obtained with the compound non-condensing engine shown by curve E. The steam consumption of the uniflow engine at 175 lbs. pressure with saturated steam running non-condensing is lower than that obtained with the compound non-condensing engine at 150 lbs. pressure shown by curve E. Also the steam consumption of the uniflow engine with 180 lbs. steam pressure and 130 degs. superheat, was lower than that of the compound condensing engine with 150 lbs. steam pressure shown by curve F.

Thus it is seen that on the basis of the results of the tests reported in this paper and the information presented by Fig. 12, which is thought to represent fairly the average practice for small, simple and compound engines of the old-

cutters, taps, reamers, etc. It is estimated by Darwin & Milner that of all the milling cutters, etc., used in the engineering world, at least 90 per cent. are still being manufactured from carbon steel, whereas, on the other hand, the

gun-metal and yellow metals, as well as for high-endurance drawing and blanking dies, lathe centres, shear blades, aeroplanes and automobile combustion engine valves, and every description of gauges and instruments which have to

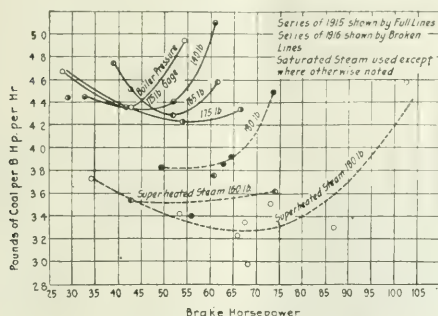


FIG. 11. CURVES SHOWING RELATION BETWEEN POUNDS OF COAL PER B.H.P. PER HOUR AND B.H.P.

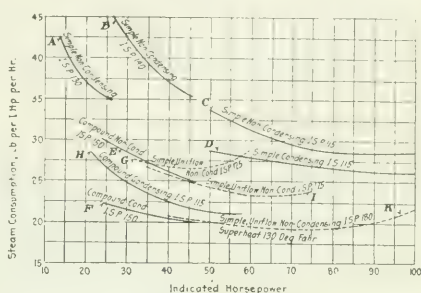


FIG. 12. RELATIVE STEAM CONSUMPTION OF BAKER UNIFLOW ENGINES AND COUNTERFLOW ENGINES.

er or counterflow type, the simple uniflow engine operating with saturated steam and non-condensing, is able to surpass in economy of steam consumption the compound counterflow engine when operating under similar conditions. Also, that the simple uniflow engine operating non-condensing but with superheated steam will have approximately the same, or slightly less, steam consumption than the compound counterflow engine operating condensing but with saturated steam.

On the basis of these conclusions, it seems probable that the simple uniflow engine will prove a serious competitor of the compound counterflow type, since it is not only more economical in its use of steam, but also simpler in construction, and probably on that account lower in first cost.

reverse is the case with turning tools, nine-tenths of which are made from tungsten high-speed steel. In the opinion of the firm the reason that high-speed steel has not been applied largely for milling cutters, taps, etc., lies in the difficulty which the tool-maker experiences in hardening such tools having fine edge at the high heat required to secure from tungsten high-speed steels its cutting efficiency. Tungsten high-speed steel requires hardening at from 1,250 deg. to 1,350 deg. C. if the best results are desired. To try and obtain this heat for milling cutters is very risky, and to harden at a lower heat gives less satisfactory results.

When the war broke out Sheffield firms received instructions that they must make milling cutters and taps from the very best high-speed steel, but there was endless trouble through the hardening process alone, with the result that carbon steel was soon substituted. Now it has been found that the maximum heat necessary for the hardening of the new steel is only 1,000 deg. C. As a matter of fact, if this heat is exceeded the tools give adverse results. This temperature allows of the manufacture of fine-edge tools of a perfectly satisfactory character with the red-cutting hardness of the tungsten high-speed steel. Hardening in practically all applications is stated to be satisfactory when the tool is allowed to cool naturally in air free from draughts and currents, whereas with tungsten high-speed steel, hardening from the extreme high heat renders it necessary to quench either with a strong air blast or a sudden immersion in liquid. With the new steel it is claimed to be possible to get absolutely the same standard of hardness throughout.

Samples of the steel have been tested in a large number of works throughout the country, and have shown that the cobaltum is specially suitable for milling cutters, twist drills, reamers, taps, automatic forming tools, screw cutting, finishing tools generally, for machining

resist abrasion. A test has been made showing that, with a carbon steel blade, saws can cut for half a day, with a tungsten high-speed steel blade for two days, but with the new steel four days without the need of grinding.

Patent rights the world over have been applied for, including, by permission of the Patent Office authorities, Germany and Austria. A point which should not be overlooked is that the cutting efficiency of the new steel is quite equal, even in the form of castings, to that of tools made from the forged or rolled bar in which high-speed steel is supplied commercially, and as the material in the molten state is much more liquid than high-speed steel, it lends itself to all forms of tool-form castings.

COBALTCROM, THE NEW STEEL
ALLOY.

WIDESPREAD interest has been aroused, says Engineering, by the announcement on behalf of Darwin & Milner of Sheffield, of the discovery of a tool steel stated to be equal in durability and hardness to high-speed steel, yet of which tungsten is not a component. "Cobalt-crom," as the new steel is called, is the outcome of much experiment and labor, extending over many years, on the part of the head of the firm of Darwin & Milner. He had long been experimenting in the direction of finding a steel which could be made without tungsten but would possess the necessary hardness of the so-called "high-speed" steels. About twelve months ago he discovered that by adding cobalt to chromium-carbon steel he converted a steel which had no appreciable red-cutting hardness into one which had this very valuable qualification.

It is a fairly well-known fact that while tungsten high-speed has for some years past been extensively used for turning, planing and slotting tools, it has not been used so largely for milling

Moulding Range Top Plate Query —

We have experienced considerable trouble in moulding range top plates. The size of these plates is 20 in. by 22 in., weight 47 lbs., thickness of outer edge 3-16 in. inner part $\frac{3}{8}$ in., with 1 in. flange on bottom all the way round at about $\frac{1}{2}$ in. from the edge. There are also four braces across the bottom. Our trouble is to get a smooth surface on top for polishing. We have found better satisfaction in moulding it top side down. We pour the metal as hot as possible and at times get a very fair surface. At other times, however, we get a very rough or pebbly surface, and sometimes small slag holes. We are using No. 1 Albany sand and have tried a number of different styles of gates. We have also tried sea coal facing without securing the desired results. Suggestions as to remedy of the trouble are invited.—H. Z. F.

"Willie, against orders, allowed his chum to take him to the river on a fishing trip."

"His father took him to the back yard on a whaling expedition."

Salesmanship Discussed from a New and Sane Viewpoint

At a recent Convention of the Sales Organization of The Steel Company of Canada, an address was given by the Sales Manager of the Company at Hamilton, George A. Simpson, which we take pleasure in presenting to our readers, as it covers a number of points in connection with Salesmanship in such a manner as to develop a new viewpoint on the subject. The address can be read and studied to advantage, especially by those within the profession, in addition, all of us may profitably apply some of the thoughts expressed by the author

ON previous occasions when it has been my privilege to address you, the conditions confronting us were not such as they are at present. We have been and are passing through a period, the like of which does not appear in history and through this abnormal condition, a prosperity that is, in my judgment, spotted, has sprung up all over the North American Continent and it will come to a temporary end directly the war terminates; in fact, I anticipate a decided change the moment there is any definite indication of peace.

The abnormal conditions produced by the war have created abnormal conditions in every line of industry and, in consequence, the producers of all kinds of material, especially iron and steel products, have increased their output to an enormous and alarming extent. This does not only apply to Canada, but also to the United States. Every blast furnace on the continent to-day is practically in operation and to take care of the increased tonnage of finished product that this abnormal conditions demands, our producing capacity has been largely increased, consequently, when conditions again assume their proper shape we will be confronted with a competitive condition such as the world has never seen before, and this condition will, in a sense, bring into effect the law of the survival of the fittest. Competition, in my judgment, will be fierce, and, in consequence, the burden will fall on the shoulders of the salesmen.

Day of "One Man Business" Gone.

After the war the business that expects to succeed will have to be safeguarded by active, alert, attentive, vigilant men—men of big vision, men who realize that while there can be only one Captain of the Ship, there is captain-material in the crew and as such they must be recognized. The order of the day will be—systematic organization so adjusted as to permit of aggressive, intensified action, all moving in harmony with a determined purpose toward a definite end. The day of the "One Man Business" is gone, just as sure as the day of intoxicated salesmen has passed into the discard. Business to-day is too big for any one man to personally direct and where any man aspires to be "IT" in an organization, that business will only expand or succeed to the extent of his vision and, in consequence, if he persists, the progress will be arrested in proportion to his ability to direct. The expansion and growth of the business will be retarded. The burden of success-

ful business must fall on many shoulders, and salesmen, worthy of the name, will be recognized and in great demand.

Selling Our Product An Essential

It will not be a question of production, as it has been during the past two years; it will be a question of selling the production we are able to produce, and this, in my judgment, is going to be a very serious problem. Every producer of iron and steel products all over this continent has increased his output to such an extent that the market will be flooded with material. To make this argument more specific, we need only refer to our own facilities, which, at the outbreak of the war, were such that we had a certain melting capacity of open hearth steel. This we have increased until today we have facilities to produce more than double the amount, and so all along the line, as a result of the terrific demand on our manufacturing facilities, our output has been speeded up to a greatly increased extent, in consequence of which we will have a very large volume of iron and steel products to sell.

Tuning Up the Sales Organization.

With this condition confronting us, the thought uppermost in my mind is, how

we shall best prepare ourselves to successfully cope with it, and I have concluded that considerable work and preparation is necessary for each and every one of us. In past years we have heard a great deal about "getting the name on the dotted line," which, of course, as you all know, means the closing of a contract of sale. While this expression has been made in the spirit of enthusiasm—all of which I recognize is a determining factor in salesmanship, as there has been nothing of any consequence accomplished without enthusiasm—yet, nevertheless, the advice to get the name on the dotted line is merely an expression and an empty phrasing of words, unless it is accompanied with some common sense suggestion as to how to prepare ourselves to bring about this much desired objective. "Getting the name on the dotted line" is usually the final operation; in other words,—it is merely the approval with our signature of the transaction which has been concluded, and, in consequence, the importance does not lie in getting the name on the dotted line, as much as it does in the manner in which we conduct the transaction, as you will readily see from this argument that the name would never be put on the dotted line, unless the transaction had been conducted in a thorough manner and to a successful end. In other words, it should not be necessary for a salesman to urge or use any mysterious tactics or enthusiastic efforts to get the buyers' name on the dotted line; but, on the contrary, he should so present his argument and create in the mind of the buyer such an intense desire to purchase that which the salesman has to sell, that the buyer would really be more anxious to get his name on the dotted line than the salesman would be to have him put it there.

Buying and Selling Are Relative.

It seems to me that salesmen should fully appreciate the fact that it takes two to make a transaction, and that it is just as necessary for the buyer to purchase the material the salesman has to sell, as it is for the salesman to sell it. In fact, he could not run his business without the material, consequently, isn't it reasonable to suppose that if you represent a high-class organization, who manufacture their products with the thought of quality uppermost in their mind and whose very foundations are built on quality and service, fully understanding and appreciating the definitions of these two words, a purchasing agent, representing a company who de-

George A. Simpson was born near Cheltenham, England. He attended school in Cardiff and Pontypool. At the age of thirteen, after the death of his parents in 1881, he went to sea. Returning to Pontypool he went to work in the puddling department of the Pontypool Iron & Tin Plate Company, and later was associated with the Panteg Steel Works in the machine shops and steel casting department. In 1886 he went to Pittsburgh, going direct to the Sligo Rolling Mills; later he became associated with the Black Diamond Steel Works, which is now a part of the Crucible Steel Company of America. For a number of years he represented The Struthers Furnace Company of Cleveland, with headquarters in Pittsburgh.

Mr. Simpson has been connected with the iron and steel industry in the Pittsburgh District for many years. He has devoted considerable thought and study to efficiency, organization, advertising and sales promotion. For some years previous to becoming associated with the Steel Company of Canada, he was connected with the Berger Interests of Canton, Ohio, as their special representative.

sires the best products that can be purchased, will want to have his name on the dotted line of that company's contract? It seems to me that it is the salesman's mission to so represent the company he works for, and so place before the buyer the articles he has to sell, as to create a desire on the part of the purchaser to want to do business with the company the salesman represents.

There are a number of manufacturing concerns in different parts of the world, who have brought their business up to this very desirable condition, and it is considered a badge of honor or compliment to the good standing of a company when they can state they buy from such a concern. The salesmen, who represent such a concern are imbued with the spirit of the organization of which they are a part, and, in consequence, they convey and impart that feeling to the man they are trying to interest. Again, in proportion to their sincerity of purpose and their belief in the statements they make do they impress and convince, and create in the mind of the buyer a desire to do business with them.

Commerce is no longer exploitation—it is human service; and no business concern or body of men can succeed or exist permanently whose efforts do not meet a human need and add to human happiness, as we succeed only through the good will and good wishes of the people we serve. "Quality" and "Service" to-day correspond with the word "Sterling" on silver. Happiness is the true end and aim of life, the result of all that is truly right and sane; therefore, it is not to urge your getting the name on the dotted line, that I propose to touch on, but to try and put forward what, in my judgment, is necessary for a salesman to understand in order to carry the transaction to a successful issue.

Rendering Service to Salesmen

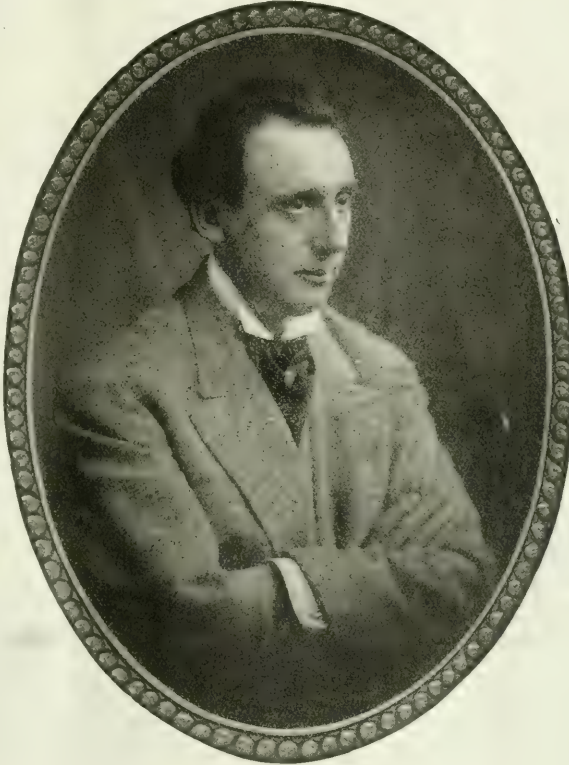
The subject of "Salesmanship" is one that has been discussed from all angles. We have heard a hundred different views from a hundred different people on the one subject, and I am free to admit that but very few of them analyze the subject to the point of rendering a service to the salesman who hears the discourse. In other words,—they deal with the subject in the abstract, rather than in the concrete. In my judgment, what a salesman ought to know and understand should be the underlying principles pertaining to salesmanship, that

is, he should be familiar with the principles which would enable him to take care of all the preliminaries necessary to bringing the transaction up to the point of getting the name on the dotted line. The question of selling is one that requires a great deal of thought and for any man to become proficient in this science, it is as necessary for him to study all the elements that enter into his success, as it is for a surgeon, doctor or lawyer, or any other professional man, to make a study of his profession

mon expression. I am free to admit there are a number of salesmen who are born with certain facilities, essential to successful salesmanship, a little more pronounced, but that a man cannot be trained to become a good salesman—if he will give the right amount of study and desires to be successful in that line, is sheer nonsense. We may just as well say that all men who follow certain professions are born into those professions, or born with certain faculties especially fitted for those professions. In my judgment, this is wrong, and I maintain that any young man, endowed with common sense, fair personality, good health and the love of work fairly pronounced, can, with the right amount of study, become a successful salesman. The truth, as always, lies between the two extremes. There is no salesman so born to his duties that he can dispense with a knowledge of the goods he sells, or so independent of experience that practice teaches him nothing he did not know. You should know what you want to do, then hold the thought firmly and do every day what should be done and every sunset will see you that much nearer to the goal. Now the question is—"What should he study and how can he prepare himself?"

Personality in Salesmanship

Last year I embodied in my discourse the science of thought and the law of attraction, both of which I know are essential factors in the success of a salesman. I will now touch on another vital element, which we will call personality that cannot be explained; it cannot be photographed, neither can the painter or sculptor reproduce it, yet it is one of the most important factors in our success or failure in life. It is this indescribable quality, which some persons have in a remarkable degree, that holds an audience spell-bound and makes people applaud beyond the bounds of enthusiasm.—Charm of personality is a divine gift that will sway the strongest character.—We are unconsciously influenced by people who possess this magnetic power. Of course, that rare charm of manner, which captivates all who come within the sphere of its influence, and that strong personality which inclines all hearts toward its fortunate possessor, are largely natural gifts. We find, however, that the man who practices unselfishness, who is generously interested in the welfare of others, who



GEORGE A. SIMPSON

before he becomes a recognized member.

I know of no calling in which it seems to be understood that any one without training may enter, other than the field of sales. It seems to be accepted in a general way, that the constituent parts of a salesman are, ability to talk—irrespective of whether he says anything—to dress well, carry a good-looking grip, and last, but not least, he is always expected to be loaded up and able to tell the latest joke and relate a funny story. This, of course, is looking at salesmanship from a ridiculous standpoint, but it is really the viewpoint from which it is seen by a great number of people.

We have also heard that salesmen are born; and "a born salesman" is a com-

feels it a privilege to do a fellow-creature a kindness—even though polished manners and a gracious presence may be conspicuous by their absence, will be an elevating influence wherever he goes. He will bring encouragement to, and uplift every life that touches his. He will be trusted by all who come in contact with him. This type of personality we may all cultivate if we will.

Success From Service

Personality is intangible; this mysterious something which we sometimes call "individuality" is often more powerful than ability that can be measured, or qualities that can be rated, and while it is, like poetry, music or art, a gift of nature, it can be acquired and cultivated to a very great extent. In this connection it is well to cultivate a mild, gentle and sympathetic voice and a sure way to cultivate it is to be mild, gentle and sympathetic yourself. The voice is the sounding board, the index of the soul. It is through the voice we give expression to our thought, therefore, fix your mind on the thought and the voice will follow; and if it is filled with truth, it will vibrate with sincerity, echo with sympathy and so convince your hearers that thoughts in their mind contrary to your own are impossible. It is the man who acts his thoughts and thinks little of the act, who succeeds. Because success is the most natural thing in the world, there is no secret to it.

The man who does not succeed fails because he has placed himself in opposition to the laws of the universe, which is progress. The pathway to success is in serving humanity. By no other means is it possible. Just live your life—work hard—and don't explain. Mind your own business and give others a chance to mind theirs and you can depend upon it great men will appreciate you for this very thing; and while I am not sure that absolute, perfect justice comes to everybody in this world, I do know that a very good way to get a fair slice of justice is not to think of it, or to be too anxious about getting it. The great rewards gravitate to the man who fits himself to receive them. The man who does his work so well that he needs no supervision has already succeeded and the acknowledgement of his success is sure to follow. The work of the world must be done and civilization is simply a search for men who can do it.

Tact, Observation, Good Taste.

Tact is also a very important factor; next to a fine manner, perhaps the most important. One should know what to do and be able to do the right thing at the proper time. Observation, good judgment and common sense are indispensable to those trying to acquire the power of personality. Referring to observation, Herbert Spencer says: "An exhaustive observation is an element of all great success," therefore, there is no position in life where a trained eye and the faculty of observation cannot be made a great success asset. The efficient salesman is always growing; he is always accumulating knowledge of every

kind. He does not merely look with his eyes—he sees with them; and he not only uses the optic nerve, but he uses his mind. He keeps his mind open to all that is new and helpful. Careless, indifferent observation does not go back of the eye. If the mind is not focussed, that which we see is not clear cut; we do not carry it with force and distinctness to the brain, and, therefore, we are not able to draw accurate conclusions. The faculty of observation is particularly susceptible of cultivation and is capable of becoming a mighty power and a big asset in the success of a salesman. No matter where you go, study the situation thoroughly; observe, and store your observation away in your mind—some day it will serve you well.

Good taste is also one of the elements of personal charm, as you cannot offend the tastes of others without hurting their sensibilities. The power to please is a tremendous asset. What can be more valuable than a personality which always attracts. It is not only valuable to a salesman, but to every one in every field of life. The ability to bring the best that is in you to the man you are trying to reach, to make a good impression at the first meeting, to approach a prospective customer as though you had known him for years—without offending his taste, without raising the least prejudice, but getting his attention and good will—is a great accomplishment. There is charm in personality from which it is hard to get away. It is difficult to snub the man who possesses it. There is something about him that arrests our prejudice and no matter how busy we may be, or how much we dislike to be interrupted, we rarely turn away a man with a pleasing personality. We must give much in order to get much; the more we radiate the more generous we are, and the more we fling ourselves out to others, the more we get back. The current will not set toward you until it goes out from you. The more generously you give, the more you get in return. In other words—as you pour out your personality, born of courtesy and kindness and the other character-forming virtues, so do you inspire respect and confidence, and invite from others a return of that which you give.

Courtesy and consideration in every walk in life is now the accepted rule. No strong man lowers himself by giving somebody a lift, no matter who that somebody is. It may be an ignorant foreigner, unversed in our ways and language; or it may be an old man or woman, a cripple or a child—it matters not—and no time is lost, for the more people you rightly direct and the more intelligence and consideration you rightly lend, the more valuable will be your life. Many men fail because they do not see the importance of being kind and courteous. Kindness, consideration and courtesy to everybody always pays; and besides, it is a pleasure to be kind. It increases our store of happiness. I have seen men lose important positions and their reputations—which are more important than position—through their

lack of courtesy to men to whom they did not think it was worth while to be kind. Beauty of character, charm of manner, attractiveness and power of expression, blended with courtesy, consideration and kindness, will open the door to any proposition, and our sincerity of purpose will clear the path of its many obstructions.

Cultivating One's Better Self

Finally, the thought I wish to convey is, that no investment will give greater returns than cultivating your better self, and thereby developing that indefinable something called personality. There is nothing that pays so well as training our minds and thoughts along the lines of the beautiful and true. It matters not how well we understand the lines we have to sell; we may be experts pertaining to technique or detail in connection with iron and steel products, or any other articles of commerce for that matter, but if we are not in harmony with nature and nature's order of things, we cannot make the success of our lives that we otherwise would. Being in harmony with nature, brings us into harmony with all about us and above all it brings us into harmony with ourselves and when this is so, and the physical is subordinated and ruled by the mental, life becomes full and complete.

I fully realize I am painting an ideal picture, although not an impossible one, and while we may not rise to the height of this ideal, we can, by following it, at least go part of the way, and this part, no matter how small, will take the place of some discordant element, which would retard our success. Therefore, I recommend that you try to open your mind and heart to the wonderful influences of nature—the beautiful and true. Realize your oneness with her and partake of the inspiration and power she imparts. Implant firmly in your mind the successful man you wish to be and so will you become, for it is the vision we hold in our mind—the ideal that is enthroned in our hearts—that we build our lives by. This we will become. It is the beauty of our thought, the quality of our minds and ideals that make the map.



FISHERIES PROTECTION VESSELS LAUNCHED

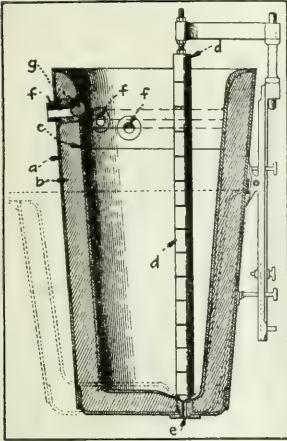
TWO more vessels for fisheries protection service were launched at nine o'clock Thursday morning, August 2, from the Polson Iron Works, Toronto. These two vessels, the St. Eloi and Festubert, are the last of six of the same class, the others launched on June 16 being named respectively the Ypres, Vimy, Messines and St. Julien. The christening ceremonies were performed by Mrs. A. H. Jeffrey, wife of the general manager of Messrs. Polsons, who christened the St. Eloi, and by Mrs. Harry Miller, wife of the vice-president of the company, who christened the Festubert, both of whom were presented with a handsome bouquet of roses.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

SELF-SKIMMING LADLE FOR STEEL FOUNDRIES.

A NEW type of ladle, described in The Iron Age, and known as a self-skimming one, has been invented by J. C. Davis, fourth vice-president of the American Steel Foundries,



NEW TYPE OF LADLE WHICH SKIMS ITSELF OF EXCESS SLAG. THE OLD TYPE IS SHOWN RELATIVELY BY THE DOTTED LINES.

Chicago. It is especially adapted for pouring steel castings and is claimed as making it possible to expose 45 per cent. less area of steel to the detrimental action of the slag than in the case of the old style ladle where basic slags are obliged to remain for a long time in contact with the metal. This is particularly the case in pouring castings, for the chemical reaction between the slag and the steel tends to lower the silicon content of the steel and to add oxygen and phosphorus to it. The new type of ladle has the further advantage, it is claimed, of imparting a greater hydrostatic head to the metal, which the inventor claims has the effect of causing the lighter slag to rise to the top of the steel and remain there while the ladle is being emptied.

In making open hearth steel, it is almost impossible to produce an exact quantity of steel of the desired composition at one time because owing to various delays more metal than was contemplated in the original charge has to be added. It is, therefore, necessary that the ladle, which is to hold the steel and its slag, be of such ample proportions as to properly receive and contain the original charge and any such additional amounts which have to be added. Normal-

ly, therefore, when a heat of steel is discharged into its ladle, there is so much space between the top of the steel and the top of the ladle that the ladle receives an excessive amount of slag, which remains usually in contact with the steel until the ladle is emptied entirely. The greater the volume of slag in the ladle, the greater the hydrostatic head or pressure exerted by the slag, thereby causing the latter to settle more deeply into the steel, increasing the slag's contaminating effect. These conditions are especially true in steel foundries.

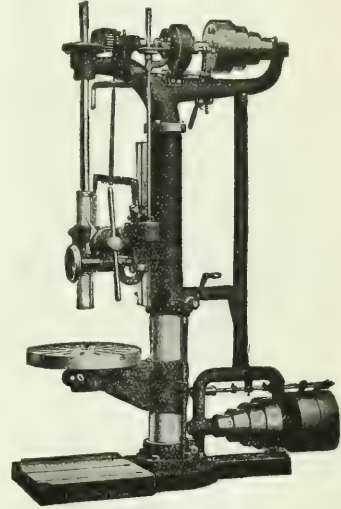
As shown in the illustration, the new ladle is of smaller diameter and is much deeper than the type generally employed. It is pierced near the top with several openings which are staggered at different levels, the purpose being to provide outlets for the removal of slag. Before the ladle is filled with steel, the slag openings are closed with a plug, composed mainly of silica sand with a binder of fire clay, and these plugs can be removed as required in order to regulate the height of the slag in the ladle to a proportion just sufficient to serve as a blanket to prevent chilling the steel. The ladle consists of an exterior shell, (a), a brick lining, (b), and a thinner lining (c), of material containing magnesite and dolomite. The stopper is shown at (d), the pouring opening at (e), and the slag holes at (f). How the slag holes are plugged is illustrated at (g).

25-IN. UPRIGHT DRILLING MACHINE

THE machine illustrated in the accompanying engraving has been designed to withstand hard usage, and at the same time maintain a high degree of accu-

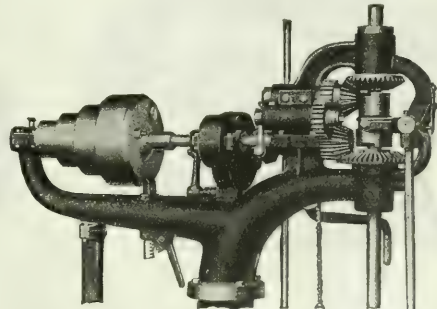
a four-stepped cone with back gears enclosed within it, instant operation of the gears being obtained by a rack and sector lever conveniently located in the upper part of the frame.

The high carbon crucible steel spindle and the sleeve are accurately ground, the spindle being provided with an imported



25-IN. UPRIGHT DRILLING MACHINE.

ball thrust bearing. The sliding head, which guides the spindle, is counterbalanced by a chain attached to a notched lever, which is also connected to the spindle, allowing the balance to be adjusted between the two parts to any desired degree by simply varying the posi-



ARRANGEMENT OF TAPPING ATTACHMENT ON UPRIGHT DRILLING MACHINE.

acy. It is provided with eight spindle speeds and six positive geared feeds. The spindle speeds are obtained through

tion of the chain on the notched lever. The sliding head has a wide bearing on the column, and is easily adjusted.

Two quick return levers are used—the one on the right being slidable in its bearing, so that it can be withdrawn to its full length to facilitate hand drilling in light work.

The six positive geared feeds, from .0056 in. to .031 in., are at the instant command of the operator, any one of them being obtainable while the machine is running. Automatic stop to down feed is set by graduations on the spindle and may be thrown out either by hand or power. Rigid construction and perfect alignment with the spindle and column is a feature of the table; while the supporting arm has a wide bearing on the column.

Ample proportions and symmetry of design characterize the frame, which is securely bolted to the base. When equipped for tapping as shown in the second illustration, the machine is provided with an additional bevel gear and pinion geared to the regular spindle gears by means of an idler eccentrically mounted so as to be thrown out of mesh when not in use. Two positive clutches engage the spindle with either pair of bevels as required.

This machine is manufactured by the Silver Mfg. Co., Salem, O., and has a net weight of 1,650 lbs., the floor space occupied being 22 in. x 62½ in. The distance from column to centre of spindle is 12½ in.; traverse of head on column, 22¼ in.; traverse of table on column, 16 in.; dia. of table, 21¼ in.; dia. of spindle, 1½ in.; feed of spindle, 9¼ in.; width of cone steps, ¾ in.; spindle speeds, 14 to 315 rev. per min.



A REMARKABLE OIL ENGINE

By H. P. Hoag

IN the issue of this journal for April 26, the writer described a certain device evolved during his experience in adapting a line of gasoline engines to burn kerosene. The engine illustrated in the accompanying sketch however, is a real

combustion engine, giving as it does the same economy as the world famed Diesel engine.

For those unfamiliar with the Diesel engine it might be stated that first, it is a high compression engine, combustion being caused by the heat of compression which is about 500 lbs. per sq. in., (it be-

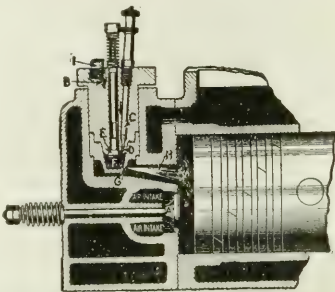


FIG. 2.—SECTION OF CYLINDER HEAD SHOWING IGNITION CUP WHICH AUTOMATICALLY FEEDS FUEL TO COMBUSTION CHAMBER.

ing an established engineering principle that a high temperature can be attained by air compression) the resulting temperature being about 1000 deg. Fahr. Nothing but pure air is taken into the cylinder during the suction stroke, then when the piston reaches the highest point of compression, fuel is injected into the cylinder by means of air compressed to about 800 lbs. per sq. in., then cooled. Combustion begins the instant the oil meets the hot air in the cylinder and continues through that part of the working stroke during which fuel is introduced. While the Diesel type gives the very highest economy known to the internal combustion engine, it is never built in small units owing to the expensive apparatus necessary to inject the fuel under such high pressures.

the fuel consumption being half a pound of fuel oil per horse power hour. Another great point of advantage this new type has over the Diesel is that it can be built in small sizes which of course is out of the question with the Diesel type as explained above. Think of an engine, without carburetor batteries, magneto, spark plug, or wires, or the application of any external heat, that will start and run on most any kind of oil, such as kerosene, distillate, fuel oil, or crude oil, in fact any kind of oil that will flow, machine, fish, lard, linseed, olive or peanut oil. This type of engine is now being built by several firms. It was recently the writer's privilege to investigate several of the Hvid type engines now building in the United States both stationary and marine, which proved very interesting indeed.

In this new principle combustion is obtained by the heat of compression as in the Diesel, but the secret of the new system is in the patented fuel cup which times the ignition and represents the only method by which combustion by compression can be easily controlled.

In the sectional view the burning oil can be seen at H, the principle of operation being as follows. During the suction stroke, pure air only enters the cylinder through the intake valve. Oil is admitted by valve E, the quantity being varied by needle valve C, which is under control of the engine governor. As the piston returns and compresses the air to about 450 lbs. per sq. in. the temperature rises to about 950 deg. Fahr. and heats the small fuel cup red hot which brings about a partial combustion of the fuel oil in the bottom of the cup, causing the pressure in the cup to immediately rise above the air pressure in the cylinder which forces the hot oil

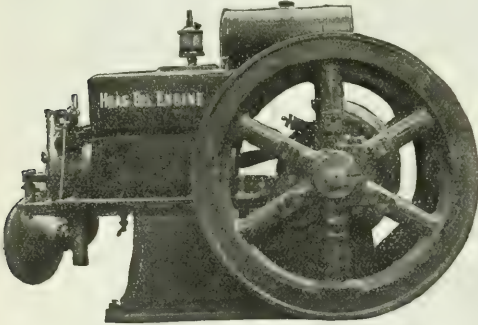


FIG. 1.—SIDE VIEW SHOWING CONVENTIONAL APPEARANCE OF ENGINE.

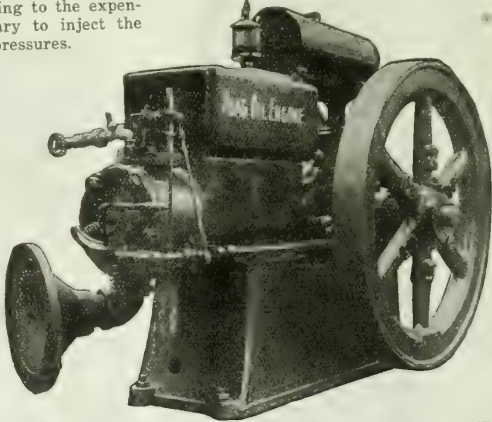


FIG. 3.—VIEW OF VALVE AND GOVERNOR GEAR. NOTE ABSENCE OF COMPLICATED MOVING PARTS.

kerosene engine that will start and run on kerosene and has neither carburetor nor electrical ignition. It is the invention of a Danish engineer, R. M. Hvid, and is bound to revolutionize the internal

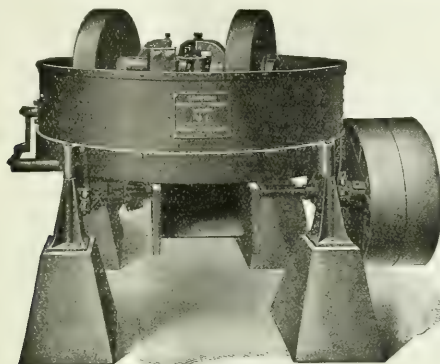
Wonderful as the reliability and fuel economy of the Diesel engine are, the Hvid principle bids fair to outclass the former owing to its extreme simplicity and ease of starting as well as economy,

out through the small pin holes in the cup into the cylinder when it comes into contact with the heated air in the cylinder and burns as shown at H, forcing the piston forward on its power stroke.

It will be seen that this new principle incorporated into a substantial design, doing away as it does with all electrical apparatus for igniting the charge, must result in simplicity and reliability and in turn supersede the gasoline engine for at least stationary, portable and marine work.

INTENSIVE FOUNDRY MIXER

AN action which squeezes and kneads the grains of each kind of sand through and amongst each other is the underlying principle which is responsible for the efficiency of the foundry mixer illustrated in the accompanying engraving. It is claimed that the squeezing or kneading action imparted by the mechanism gives



INTENSIVE FOUNDRY MIXER.

a degree of mixing impossible to get by hand or from the pugmill type, while the breakage of the sand grains which takes place with excessively heavy mullers is obviated by designing the mullers of just sufficient weight and width of face to mull and knead the sand properly so as to produce the necessary plasticity and toughness without breaking the grain of sand, thereby retaining the original porosity and openness of the mixture.

The illustration shows the exterior view of No. 22 mixer having a pan 6 ft. in diameter, with mullers 30 in. dia. by 6 in. face, set at different radii from the centre so as to cover 10½ in. width of track. The pan is stationary and carries a turret on which are bearings for a central supporting casting in which is fastened a vertical drive shaft from the bevel gearing underneath. The central supporting casting carries the plows and the mullers, the function of the plows being to turn over and move the sand mixture alternately inwards and outwards, the outside plows throwing the mass of sand toward the inner muller and the inside plows doing likewise to the outer muller. The mullers revolve on their own axis as they travel around the pan, their paths being at the points where the mixture is heaped up highest by the movement of the plows. The action of the plows, together with the kneading and squeezing action of the mullers results in a thorough incorpora-

tion of all the elements of the mixture regardless of its composition.

The builders of this machine are the National Engineering Co., Chicago, who make it in two sizes, the No. 1, or 4 ft. mixer having a capacity of 3½ to 4 cub. ft. per charge, while the No. 2 machine, illustrated, takes 7 to 10 cub. ft., which includes the quota of coal dust when facing sand is being mixed, or binder when core sand is required.

PLUG EXTRACTOR FOR SHELLS

AT a certain stage in the manufacture of shell it is necessary to screw into the nose a temporary wooden plug, which is frequently difficult to remove by ordin-

Holbeck-Lane, Leeds, has designed and introduced a machine for the effective removal of the plugs with the minimum of exertion. The construction and operation of the machine are shown in the accompanying drawings, from which it will be seen that the shell is first securely gripped. Then, by means of a few turns of a hand wheel, the plug is removed.

The machine can be fixed on a bench or table. The shell is placed in a recess in a vice, in which it is firmly held by means of the band A, which is brought down and tightened by means of the handle B pivoted at C. After this has been accomplished, the depression of the hand lever D against the action of the spring J causes the tongued and spiked clutch E on the end of the spindle F to engage the plug. Then, by turning the hand wheel G, which is geared to the spindle by the bevel wheels H, the plug is unscrewed. On the end of the handle or lever B is a projection or lug, by means of which the gripping band is released after the plug has been withdrawn. The machine can also be adapted for the removal of metal plugs by replacing the tongued and spiked clutch E by an attachment K having a square projection on the bottom for fitting into a corresponding recess in the plug.

We understand that these machines are in use in several shell factories and are giving satisfaction, says The Engineer.

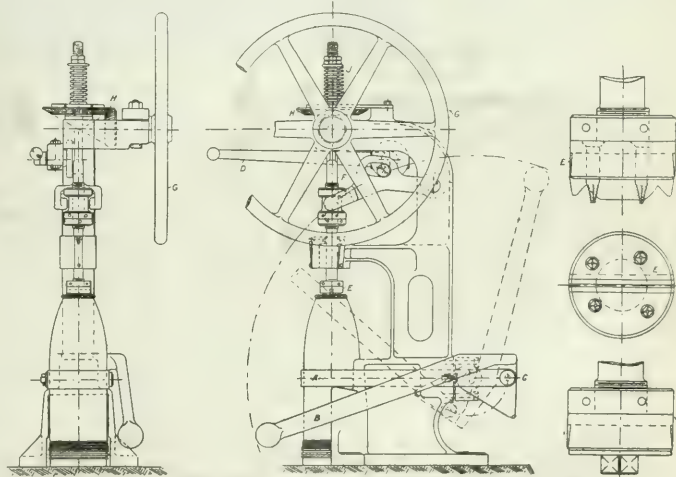
A colored janitor was pressed to tell why he had left the Methodists and joined another church. "Well," he replied, "we is moh oddehly; we has moh style."

"Yes; but what do you do?" he was asked.

"Well, fo' one thing, we has responsible readin's."

"Well, what else?"

"Well, we has Koman candles on the altah, and ther we buhn insect powdeh."



SHELL PLUG EXTRACTING MACHINE.

The MacLean Publishing Company

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AVOID WASTE.

THE world war has taken so many producers from the sources of food supply that the world's consumption of food is greater than the amount available, and consequently, food reserves are being rapidly depleted. Millions of men are actively engaged in warfare and in the supply of munitions and equipment. They are fighting our battles and we must provide their food. Canada will produce all the food we can consume, but Canadians have never been known as a selfish race. Our Allies, therefore, are depending upon us for help and our people will unquestionably respond with generous hand.

Sir Robert Borden has said that Canada is in the war "to the last man and the last dollar." Canada is also in the war to the last pound of food. Canadians are their brothers' keepers, and will feed them, cost what it may. It is necessary, therefore, that we practise economy of the food supply. It is better to deny ourselves from choice than from necessity. There is no denying that there will be a food shortage, and the present is the time to put into practice thrift and rigid economy in the use of food.



EXERCISING THE MENTAL FACULTIES.

HOW many workmen in the industrial world realize the loss they sustain by failing to make the most of the opportunities that each day has to offer. The vast majority of employees are apparently satisfied to "put in the time" at their daily task without much more than a passing thought as to the "why" or the "how" of its accomplishment. The successful achievement of one's duties is an essential factor in the solution of life's problem, nevertheless, it is equally if not more important that the full faculties of the mind be employed as a co-worker with, and a silent advisor of the eyes, ears and hands, to insure increased confidence in future effort. Many men force their bodies to the physical toils of the day, while their minds are too often dwelling on the night before or the nights that are to come. We call to mind some few years ago, a youth serving his apprenticeship in the same shop as the writer, who for weeks at a time—from his own statements—had not retired to rest before two in the morning, and often as late as three or four, and more than

once he remarked that he had just time to change his clothes before coming to work. These conditions were not conducive to improving his engineering ability, inasmuch as his energies were being consumed by what might be termed riotous living, the inevitable result being a failure to concentrate his mind upon the proper performance of his work, often entertaining the other workmen with the exploits of the previous "evening," dancing being his particular failing. This in itself was perhaps not so pernicious, had it not been for the fact that these confidences were often given while individual mechanics were endeavoring to instruct him how to perform a certain piece of work. Even in his fourth year he could not be relied upon to set the change gears on an engine lathe to cut an ordinary thread.

It must not be assumed that conditions such as these are typical of the average mechanic, but they are nevertheless common in probably a modified degree. The characteristic of marked indifference that is often emphasized in the actions of the average workman, is expressive that he is only an employee and that he is paid for what he does and not for what he knows. This in a great measure is undoubtedly true, but it is also true that the more intelligently he does his work, the better he is paid; not alone in monetary remuneration, but in the acquisition of valuable knowledge that eventually forms the most potential assets that one can possess. It is often sufficient, in the eyes of the man's employer, that he successfully perform the work that is intended; however, we should never forget that our future is in our own hands and not in those of our boss. This fact should spur us on to apply ourselves to our work in such a manner that our efforts will not only be appreciated by our superiors but will open the way for greater personal responsibilities and wider opportunities.

One of the fundamental facts that a young man should be early possessed of, is that self-reliance is one of the master keys to success, but it is well to remember that locks will often resist the efforts of a rusty key. It is, therefore, essential that this self-reliance be based on the ability to achieve results, and this ability can only be acquired by the constant and conscientious application of one's faculties to the questions of the moment; studying every detail of the work so that each becomes lessons instead of examples, the latter in many cases being but the forerunner of the automaton.

Physical achievement unaccompanied by mental effort is but so much waste of energy. Thinking of one's work is necessary if the man is to become the master. The reasoning powers of the individual deteriorate more from disuse than overuse. Machinery that is constantly neglected will be ruined more rapidly than that in continual use.

Every person, no matter how insignificant his position, or how apparently unimportant his duties may appear, should strive to master the smallest detail, so as to better fit him for the larger opportunities that are open to all. All positions of responsibility require and demand, ready resource, originality, personal initiative and self-reliance; and the latter can only be acquired when one is amply possessed of the other three. They tell us that hypnotism is the mastery of mind over matter, and present day industrial activity may be likened to this science or practice, where the master mind is in the plant executives and the matter represented by the working masses. While much may be said in favor of this subjective system, it nevertheless has the tendency to instil in the workman the functional elements of mechanical application only, which in turn too often creates a spirit of indifference and may in time eliminate that reasoning power which is so essential to individual advancement.

INDUSTRIAL NOTABILITIES

WALTER HOWARD BURGESS, vice-president and general manager, International Malleable Iron Co., Ltd., Guelph, Ont., was born in Lynn, Mass., Sept. 29, 1879, and received his education in Lynn Public and High Schools and Business College.

He entered the employment of the Laconia Car Mfg. Co., Laconia, N.H., 1900-1905; became assistant general superintendent, Wilmington Malleable Iron Co., Wilmington, Del., 1906; becoming general superintendent, Trenton Malleable Iron Co., Trenton,



WALTER HOWARD BURGESS.

N.J., 1907-1910. At a later date he spent sometime at Chicago with the parent company of the latter concern (Illinois Malleable Iron Co.) preparatory to coming to Canada to establish the present plant of which he was superintendent, becoming vice-president and general manager, August, 1916. The plant now employs some 250 hands and extensive additions are in progress.

Mr. Burgess is a member of Canadian Manufacturers' Association. His society affiliations are confined to A.F. and A.M. (Shriners), while his principal recreation is golf.

In April, 1910, he married Dorothy D. Small, their family consisting of one son and one daughter. Their residence is 10 Edwin Street, Guelph, Ont.

Mr. Burgess subscribes to the Congregational creed, and in politics is Independent.

—Photo, Courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh.....	\$47 95
Lake Superior, charcoal, Chicago.....	58 00
Standard low phos., Philadelphia.....	87 00
Bessemer, Pittsburgh.....	55 95
Basic, Valley furnace.....	53 00
Staybolt iron.....	Montreal Toronto
Hamilton.....	
Victoria.....	

FINISHED IRON AND STEEL.

Per lb. to Large Buyers.....	Cents
Iron bars, base, Toronto.....	5 25
Steel bars, base, Toronto.....	5 50
Steel bars, 2 in. to 4 in. base.....	6 00
Steel bars, 4 in. and larger base.....	7 00
Iron bars, base, Montreal.....	5 25
Steel bars, base, Montreal.....	5 50
Reinforcing bars, base.....	5 25
Steel hoops.....	7 50
Refined iron.....	5 50
Norway iron.....	11 00
Tire steel.....	5 50
Spring steel.....	7 00
Band steel, No. 10 gauge.....	5 75
Chequered floor plate, 3-16 in. 12 in.	12 00
Chequered floor plate, 1/4 in. 12 in.	8 50
Staybolt iron.....	5 50
Bessemer rails, heavy at mill.....	38 00
Steel bars, Pittsburgh.....	4 50
Tank plates, Pittsburgh.....	9 00
Structural shapes, Pittsburgh.....	4 50
Steel hoops, Pittsburgh.....	5 25
F.O.B. Toronto Warehouse.....	
Steel bars.....	5 50
Small shapes.....	5 75
F.O.B. Chicago Warehouse.....	
Steel bars.....	5 00
Structural shapes.....	5 00
Plates.....	8 50

FREIGHT RATES.

Pittsburgh to Following Points	
Montreal.....	23 1
St. John, N.B.....	35 1
Halifax.....	35 1
Toronto.....	18 9
Cueph.....	18 9
London.....	23 1
Windsor.....	18 9
Winnipeg.....	64 9

METALS.

Lake copper.....	\$31 00	\$35 00
Electro copper.....	34 00	35 00
Castings, copper.....	33 00	34 00
Tin.....	62 00	63 00
Spelter.....	11 00	11 00
Lead.....	13 50	13 00
Antimony.....	20 00	20 00
Aluminum.....	20 00	64 00

Prices per 100 lbs.

PLATES.

Plates, 1/4 to 1/2.....	\$12 00	\$12 00
Heads.....	12 30	12 30
Tank plates, 3-16 in. 12 65	12 25	

WROUGHT PIPE.

Effective July 5, 1917.	
Black Galvanized	
Standard Butt weld.	

Size.	Per 100 feet
1 in.....	\$ 5 00
1 1/4 in.....	7 16
1 1/2 in.....	6 46
2 in.....	8 03
2 1/2 in.....	8 17
3 in.....	10 29
3 1/2 in.....	12 07
4 in.....	16 33
4 1/2 in.....	23 61
5 in.....	26 20
5 1/2 in.....	42 12
6 in.....	55 08
6 1/2 in.....	69 92
7 in.....	82 84

Standard Lapweld.

2 in.....	29 23	35 71
2 1/2 in.....	43 88	54 11
3 in.....	57 38	70 76
3 1/2 in.....	71 76	89 70
4 in.....	85 02	106 28
4 1/2 in.....	96 52	121 29
5 in.....	112 50	141 84
5 1/2 in.....	145 90	183 36
6 in.....	190 40	238 00
6 1/2 in.....	230 00	250 00
7 in.....	230 40	288 00
8 in.....	276 00	345 00
8 1/2 in.....	276 00	320 00
10 in.....	329 60	412 00

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES.

4" and under, 45%.....	
4 1/2" and larger, 45%.....	
4" and under, running thread, 25%.....	
Standard couplings, 4" and under, 35%.....	
4 1/2" and larger, 15%.....	

OLD MATERIAL.

Dealers' Buying Prices.	Montreal	Toronto
Copper, light.....	\$23 00	\$22 00
Copper, crucible.....	26 00	27 00
Copper, heavy.....	26 00	26 50
Copper wire.....	26 00	26 50
No. 1 machine composition.....	20 00	22 00
New brass turnings.....	16 00	19 00
No. 1 brass turnings.....	14 00	16 00
Light brass.....	12 00	10 50
Medium brass.....	16 00	16 00
Heavy brass.....	18 00	18 00
Heavy melting steel.....	21 00	17 00
Steel turnings.....	11 00	8 00
Shell turnings.....	12 00	12 00
Boiler plate.....	18 00	10 50
Axles, wrought iron.....	25 00	24 00
Rails.....	20 00	18 00
No. 1 machine cast iron.....	27 00	25 00
Malleable scrap.....	20 00	20 00
Pipe, wrought.....	19 00	20 00
Car wheels.....	26 00	25 00
Steel axles.....	29 00	30 00
Mach. shop turn'gs.....	8 50	8 50
Cast borings.....	12 00	8 50
Stove plate.....	19 00	19 00
Scrap zinc.....	8 00	9 50
Heavy lead.....	11 00	10 75
Tea lead.....	7 00	7 00
Aluminum.....	35 00	35 00

BOLTS, NUTS AND SCREWS.

Carriage bolts, 5/8" and less.....	Per Cent.
Carriage bolts 7-16 and up.....	net
Coach and lag screws.....	net
Stove bolts.....	55
Plate washers.....	List plus 10
Machine bolts, 7-16 and over.....	net
Machine bolts, 5/8 and less.....	10
Blank bolts.....	25
Iron rivets and bolts.....	net
Elevator bolts.....	50 and 5
Machine screws, 1/4 and 1/2 in. steel.....	27 1/2
Machine screws, 3/8 and 1/2 in. hd. steel.....	10
Machine screws, 5/8 and 3/4 in. hd. brass.....	add 20
Machine screws, 1/2 and 5/8 in. hd. brass.....	add 25
Nuts, square blank.....	add \$1 50
Nuts, square, tapped.....	add 1 75
Nuts, hex. blank.....	add 1 75
Nuts, hex. tapped.....	add 2 00
Copper rivets and burrs.....	
list plus.....	30
Brass only list plus.....	25
Iron rivets and burrs.....	17 1/2
Boiler rivets, base 3/4 in. and larger.....	\$7 60
Structural rivets, as above.....	7 50
Wood screws, flat, bright.....	.72 1/2

Wood screws, O. & R., bright.....	.67 1/2
Wood screws, flat, brass.....	.37 1/2
Wood screws, O. & R., brass.....	.32 1/2
Wood screws, flat, bronze.....	.27 1/2
Wood screws, O. & R., bronze.....	.25

MILLED PRODUCTS.

Set screws.....	Per cent.
Sq. & Hex. Head Cap Screws.....	35
Rd. & Fil. Head Cap Screws.....	30
Flat 1/2 But. Hd. Cap Screws.....	10
Fin. & Semi-Fin. nuts up to 1 in.....	25
Fin. and semi-fin. nuts, over 1 in., up to 1 1/2 in.....	30
Fin. and semi-fin. nuts, over 1 1/2 in., up to 2 in.....	10
Studs.....	20
Taper plus.....	40
Coupling bolts, plus.....	10
Planer head bolts, without fillet, list plus.....	10
Planer head bolts, with fillet, list plus 10 and.....	10
Planer head bolt nuts, same as finished nuts.....	net
Planer bolt washers.....	net
Hollow set screws.....	list plus 20
Collar screws.....	list plus 30
Thumb screws.....	65
Thumb nuts.....	65
Pat. bolts.....	add 40
Cold pressed nuts to 1 1/2 in.....	add \$4 50
Cold pressed nuts over 1 1/2 in.....	add \$7 00

BILLETS.

Bessemer billets.....	Per gross ton
Open-hearth billets.....	\$100 00
O.H. sheet bars.....	100 00
Forging billets.....	105 00
Wire rods.....	125 00
F.O.B. Pittsburgh.....	95 00

NAILS AND SPIKES.

Wire nails.....	5 50	5 45
Gal. nails.....	5 70	5 30
Miscellaneous wire nails.....	6 00	
Spikes, 3/4 in. and larger.....	7 50	
Spikes, 1/4 and 5-16 in.....	8 00	

MISCELLANEOUS.

Solder, strictly.....	0 38
Solder, guaranteed.....	0 41
Babbitt metals.....	16 to 65
Soldering coppers, lb.....	0 53
Lead wool, per lb.....	0 15
Putty, 100-lb. drum.....	4 35
White lead, pure, cwt.....	19 00
Red dry lead, 100-lb. kegs.....	15 45
per cwt.....	15 45
Glue, English.....	0 38
Tarred slaters' paper, roll 05.....	
Gasoline, per gal., bulk.....	0 31 1/2
Benzine, per gal., bulk.....	0 30 1/2
Pure turpentine, single bbls., gal.....	0 60
Linseed oil, raw, single bbls.....	1 27
Linseed oil, hulled, single bbls.....	1 30
Plaster of Paris, per bbl.....	2 50
Sandpaper, B. & A. list plus 20.....	
Emery Cloth.....	list plus 33 1-3
Borax, crystal.....	15
Sal Soda.....	0 03 1/2
Sulphur, rolls.....	0 05
Sulphur, commercial.....	0 04 1/2
Rosin "D," per lb.....	0 03
Rosin "G," per lb.....	0 03 1/2
Borax crystal and granular.....	0 15
Wood alcohol, per gallon.....	2 15
Whiting, plain, per 100 lbs.....	2 20

ROPE AND PACKINGS	
Plumbers' oakum, per lb.....	.09
Packing, square braided.....	.34
Packing, No. 1 Italian.....	.40
Packing, No. 2 Italian.....	.32
Pure Manila rope.....	.37
British Manila rope.....	.31
New Zealand Hemp.....	.31
Transmission rope, Manila.....	.43
Drilling cables, Manila.....	.39
Cotton rope, 1/4 in. and up.....	.47

POLISHED DRILL ROD.

Discount off list, Montreal and Toronto.....	25%
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CARBON DRILLS AND REAMERS.

Per Cent.	
S.S. drills, wire sizes up to 52 40	
S.S. drills, wire sizes, No. 53 to 80.....	25
Standard drills to 1 1/2 in.....	40
Standard drills, over 1 1/2 in.....	10
3-fluted drills plus.....	10
Jobbers' and letter sizes.....	40
Bit stock.....	40
Ratchet drills.....	15
S.S. drills for wood.....	40
Wood boring brace drills.....	30
Electricians' bits.....	38
Sockets.....	40
Sleeves.....	40
Taper pin reamers.....	30
Drills and countersinks.....	20
Bridge reamers.....	list plus 45
Centre reamers.....	45
Chucking reamers.....	10
Hand reamers.....	15

COLD ROLLED SHAFTING.

At mill.....	list plus 40%
At warehouse.....	list plus 50%
Discounts off new list. Warehouse price at Montreal and Toronto.....	

IRON PIPE FITTINGS.

Canadian malleable, A, add 7 1/2% B and C, 10%; cast iron, 35%; standard bushings, 50%; headers, 60; flanged unions, 40; malleable bushings, 50; nipples, 55; malleable lipped unions, 50.	
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SHEETS.

Montreal Toronto	
Sheets, black, No. 28 \$11 00	\$11 00
Sheets, black, No. 10, 11 50	11 50
Canada plates, dull, 52 sheets.....	11 00
Canada plates, all bright.....	12 50
Applco brand, 10% oz. galvanized.....	12 25
Queen's Head, 28 B.....	11 75
W.G. Fleur-de-Lis, 28 B.W.....	11 75
Gorb's Best, No. 28 10 25	10 25
Calhorne Crown, No. 28.....	11 25
Premier, No. 28 U.S. 11 75	11 75
Premier, 10 1/2 oz., 13 85	12 00
Zinc sheets.....	20 00

PROOF COIL CHAIN.

B	
1 1/4 in.....	\$12 00
5-16 in.....	11 50
1 in.....	11 15
7-16 in.....	10 90
1 1/2 in.....	10 70
9-16 in.....	10 70
3/4 in.....	10 50
3/8 in.....	10 40
@ in.....	10 25
1 inch.....	10 10
Extra for B.B. Chain.....	1 20
Extra for B.B. Chain.....	1 80

ELECTRIC WELD COIL CHAIN B.B.

1/4 in.	\$15 50
3-16 in.	11 70
1/2 in.	8 40
5-16 in.	7 40
3/4 in.	6 50
7-16 in.	6 35
1 1/4 in.	6 35
5/8 in.	6 35
3/4 in.	6 35

PRICES per 100 lbs.**FILES AND RASPS.**

	Per Cent.
Great Western, American	50
Kearney & Foot, Acende	50
J. Barton Smith, Eagle	50
Maclelland, Globe	50
Whitman & Barnes	50
Black Diamond	40
Delta Files	37 1/2
Nicholson	40
P.H. and Imperial	50
Globe	50
Vulcan	50
Disston	50

COAL AND COKE.

Solvay Foundry Coke	\$10 90
Cannelville Foundry Coke	8 50
Steam Lump Coal	8 50
Best Black	8 95

Net ton f.o.b. Toronto

BOILER TUBES.

Size.	Seamless	Lap-welded
1 in.	\$33 00	...
1 1/4 in.	36 00	...
1 1/2 in.	38 00	32 00
1 3/4 in.	38 00	32 00
2 in.	45 00	33 00
2 1/4 in.	48 00	35 00
2 1/2 in.	50 00	38 00
3 in.	58 00	45 00
3 1/2 in.	65 00	53 00
3 3/4 in.	70 00	55 00
4 in.	82 00	67 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	40
Royalite, per gal., bulk	16
Palatine	19
Machine oil, per gal.	26 1/4

Black oil, per gal.	13
Cylinder oil, Capital	45 1/2
Cylinder oil, Acme	36 1/2
Standard cutting compound, per lb.	6 06
Lard oil, per gal.	2 50
Unions thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37 1/2
Imperial quenching oil	39 1/2
Petroleum fuel oil	11

BELTING—NO. 1 OAK**TANNED.**

Extra heavy, single and double	30-50%
Standard	40%
Cut leather lacing, No. 1	1 50
Leather in sides	1 35

TAPES.

Chesterman Metallic, 50 ft. \$2 00	
Lufkin Metallic, 608, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

WASTE.**White Cents per lb.**

XXX Extra	20
Peerless	20
Grand	19
Superior	19
X L C R	18
Atlas	18
X Empire	18
Ideal	17
X press	16

COLORED.

Lion	14 1/2
Standard	13
No. 1	13
Popular	11 1/4
Keen	10 1/4

WOOL PACKING.

Arrow	25
Axle	20
Anvil	15
Anchor	11

WASHED WIPERS.

Select White	12
Mixed colored	10
Dark colored	09

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	40%
Best grades	20%

ANODES.

Nickel	.50 to .54
Cobalt	1.75 to 2.00
Copper	.44 to .46
Tin	.49 to .56
Zinc	.23 to .25

Prices Per Lb.**COPPER PRODUCTS.****Montreal Toronto**

Bars, 1/2 to 2 in.	53 00	53 00
Copper wire, list plus 10.		
Plain sheets, 14 oz.		
14x28 in. 14x60 in.	53 00	53 50
Copper sheet, tinned.		
14x60, 14 oz.	60 00	54 25
Copper sheet, planished, 14x60 base.	64 00	60 00
Braziers', in sheets, 6x4 base	55 00	52 00

BRASS.

Brass rods, base 1/2 in to 1 in rd.	0 55
Brass sheets, 8 in. wide, 20 oz.	0 60
Brass tubing, seamless.	0 67
Copper tubing, seamless.	0 58

PLATING SUPPLIES.

Polishing wheels, felt.	3 00
Polishing wheels, bull-neck	1 75
Emery in kegs, American	06
Pumice, ground	05
Emery glue	15 to 20
Tripoli composition	04 to 06
Crocus composition	07 to 08
Emery composition	08 to 09

Rouge, silver	35 to 50
Rouge, powder	30 to 35

Prices Per Lb.**LEAD SHEETS.**

Sheets, 2 lbs. sq. ft.	\$18 00	\$18 00
Sheets, 3 1/2 lbs. sq. ft.	18 00	18 00
Sheets, 4 to 6 lbs. sq. ft.	17 50	17 50
Cut sheets, 1/2 per lb. extra.		
Cut sheets to size, 1c per lb. extra.		

PLATING CHEMICALS.

Acid, boric	.15
Acid, hydrochloric	.06
Acid, hydrofluoric	.14 1/2
Acid, nitric	.10
Acid, sulphuric	.06
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhyd.	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.36
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (sub-sulfide)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.65
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hypsulphite, per 100 lbs.	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Condition and Tendency

THERE has been no material change in the iron and steel situation since last week, the market being a waiting one pending a definite announcement by the American Government with regard to prices. It is believed in some quarters that prices to private consumers will not be controlled, but, of course, nothing is known as to what action the Government is likely to take in this regard. The heat wave caused a considerable reduction in the output of both iron and steel, this, however, is always expected during July and August. Buying has been inactive due to the uncertainty with regard to prices and also on account of the summer dullness in the trade. Prices of steel products are unchanged, although a weaker tendency has developed in some lines. The pig iron situation is unchanged, prices of domestic irons being still withdrawn. Business is practically at a standstill as consumers are keeping out of the market for the present until the situation clears up. Coke prices are showing an easier tendency, but production has been considerably affected by the hot weather. There is some fear of a shortage both in coal and coke, and consumers are stocking up. The scrap market is dull and featureless with quotations unchanged. The non-ferrous metal markets are not as yet showing any marked activity, as consumers continue to hold off pending developments in regard to prices. Copper is a little firmer, due to shortage on account of the strikes.

Montreal, Que., Aug. 6, 1917.—Despite the volume of business that marks the activity of the many industrial interests at the present time, the difficulties of the manufacturers are steadily increasing. The shortage of cars is a factor that

prevents the maximum from being accomplished and hinders the free transportation of raw and finished materials to their various destinations. This feature of the situation is likely to become further emphasized in the near fu-

ture as the volume of rolling stock that will be required for the handling of the crops, and also the transporting of military supplies to the various U.S. training camps will seriously affect the moving of other supplies. A feature of the week has been the report that the American Government will take over all ships building, and also all shipyards, as a step in facilitating the construction of ship building in U.S. shipyards. This action may precede the acquisition of all ships flying the American flag, as a means of better controlling the shipping of materials to and from Europe and other countries. General activity continues unabated but the situation in the States is to some extent dominating the market here, owing to certain complications that are arising out of current developments.

Pig Iron

The situation is still characterized by the uncertainty incidental to the delayed action of the American Government in announcing the price regulations for this and other commodities. Present conditions are not conducive to active buying and the market in consequence has been rather quiet. In contrast to the strong and upward movement of pig iron during the past year it is interesting to note that the past few weeks of inactivity have been followed by a slight falling off in the price quoted for Bessemer and basic pig; both these grades

having declined \$2 during the week, the respective quotations being \$55.95 and \$52.95 per ton. The local situation is unchanged with Canadian prices still withheld.

Steel

The strong position that steel has maintained for many months appears to have reached its maximum, and in some respects may be even now on the wane. The developments of the past six weeks, in which the American Government has been endeavoring to set prices and regulate the distribution of all classes of war material, has seemed to be the order for the various markets to mark time, the resulting situation having been characterized by a degree of uncertainty and nervousness that has created a reluctance on the part of producers and consumers to take an active interest in the market. The possibility that the government would dominate the situation in the regulation of prices, based on the actual cost of production, had the tendency for a time to disorganize the market, but this feeling has given place to a more encouraging one where the domestic requirements will still figure in the question of supply and demand, although, while an easier market may govern the needs of the Government, the outside situation will experience little relief, at least for the immediate future. Guided by the experience of the past three years, the U.S. Government are going into every detail before announcing a definite policy of market control, and it is the magnitude of the task and the amount of work involved that continues to keep the trade in the dark as to the final decision of the department heads. Under existing conditions it would be impossible to predict what will take place during the coming weeks, and during this interval excessive activity is not expected. Few price changes are reported and the general market conditions are unchanged. The feature continues to be the heavy demands on plate mills for shipbuilding requirements. The Pittsburgh quotation on refined iron bars has been advanced \$5 per ton, the price now quoted being 5½¢ per lb. A factor that may soon affect steel conditions is the lower price quoted on Bessemer and basic pig, a decline of \$2 per ton being reported during the week. Local conditions are relatively the same with prices firm; dealers say that the transportation difficulties have slightly increased owing to the shortage of cars, especially where materials are being shipped from the States.

Metals

The situation is still dominated by uncertain conditions prevailing in the States, as the delay in establishing the price regulations has the tendency to maintain an unsettled market. Buyers are reluctant to cover future requirements under these conditions and trading is consequently affected. Copper is settling down again after a short period of strength. Tin is unsettled but the early future promises a better market. Spelter is uncertain. Lead is firm but inac-

tive. Antimony is firmer on better demand. Aluminum is firm and unchanged.

Copper.—The market is again reacting after a temporary spell of strength, during which however, no marked activity was evident. Consumers are still holding aloof from the market which is marked by the uncertainty prevailing through delayed action of the authorities at Washington. New York quotations on lake and electrolytic are unchanged, but the latter was higher during the earlier part of the week; prices quoted at present being 30¢ and 28½¢ respectively. The quotation on casting however, is on a par with electrolytic, on an advance of 2¢ per lb. The local market is firm and unchanged on a steady demand; dealers' prices are 34¢ for lake and electro, and 33¢ for castings.

Tin.—The situation is practically unchanged with New York prices ¼¢ higher than a week ago but lower than those quoted earlier in the week. The recent rise has resulted from the stronger position of the London tin market. The market has been a little more active of late but is still influenced by the uncertain attitude of the Government in connection with the price regulations. A fac-

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion \$100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

tor that may tend to facilitate the shipment of tin is the fact that all ocean transportation will soon be in the hands of the Government. Local conditions are unchanged with prices firm at 62¢ per lb.

Spelter.—Considerable interest has been created by the recent action of the American Government in connection with the changes that have been made in the method of purchasing spelter for their future requirements. New York continues to quote 8½¢ per lb. The local market is not very active but is comparatively firm at last week's price of 11¢ per lb.

Lead.—The market is a quiet one but relatively firm. Prices are well maintained on large lots but small quantities are apparently available at prices below the current quotations. The U.S. Government has placed additional orders for lead requirements but it is not definitely known the exact price that has been paid; some reports say that the price has been 8½¢ but others claim that the price is the same as that paid for the previous supply, 8¢ per lb. The local market is well maintained on fair demand but with

a weak undertone; price is unchanged at 13½¢ per lb.

Antimony.—The market is not particularly active but maintains its firmness. New York quotations of 15½¢ are ½¢ higher than last week. Local conditions are unchanged with prices steady at 20¢ per lb.

Aluminum.—The market continues to be relatively firm on a steady demand; prices are the same as last week, 65¢ per lb.

Machine Tools and Supplies

The local situation has not been marked by any pronounced activity in the demand for machine tools, the week having been a very quiet one. Fair inquiry is reported from shipbuilding firms and those contemplating the construction of accessories, but the inability to secure the desired equipment is one of the features of the market. The varied nature of the tools suitable for this class of work eliminates the possibility of utilizing the tools that have done service in the munitions plants, and the surplus of shell machinery, made available by the decline of large munition work, offers little relief to the new industry. Shipping conditions are more acute and delivery to customer is emphasizing the difficulties of the present situation. The demands for all classes of supplies continues heavy and the market is still characterized by advances in price quotations.

Scrap

Influenced by the weaker tendency that appears to be developing in the general iron and steel situation, the scrap market is a little unsettled and an easier tone is apparent. The American market shows a considerable falling off in all scrap iron and steel quotations, and local dealers are inclined to think that the Canadian market will also respond. Prices here are easier, heavy melting steel at \$20 per ton shows a decline of \$2 per ton. Rails are quoted at \$20, machine cast iron at \$27, iron car wheels at \$26 and steel axles at \$29; these representing a decline of \$1 per ton. A better tone is evident in old metals, and prices in the States indicate a stronger market; dealers here, however, are quoting last week's prices on a fairly steady market.

Toronto, Ont., Aug. 7.—During the hot weather there was a general falling off in output of the factories but conditions are now more normal in this respect. Workers in the steel mills furnaces and forging plants were the greatest sufferers and output was consequently reduced considerably. In all trades during the summer, particularly during August there is less activity and a general falling off in the consuming demand.

Steel

The situation in the steel market has undergone no material change since last week and the trade continue to await developments in regard to prices. The usual summer dullness prevails and under ordinary conditions business would not be brisk, but there is no doubt that

the cessation of buying is due to the uncertainty over what action will be taken on prices by the American Government. It is unlikely that conditions will improve until this uncertainty is removed which will probably not be for some weeks owing to the complicated nature of the Federal Commission's investigations.

Conditions in Canada are directly affected by the situation in the States owing to the close connection between the two markets. The chief point of interest lies in the position of the private consumer as there is some possibility of the Government price control being extended to include these consumers. The majority of consumers, however, believe that the Government will allow the law of supply and demand to regulate prices to them, in which case it is doubtful if there would be any important decline in values although the impression is generally held that prices have about reached the top. The fact that the steel mills are booked up so far ahead will have a tendency to steady the market and although prices are easier for the time being, there have been no declines. It is a waiting market at present and price movements, in either direction, depend largely on the action of the American Government. In regard to the shortage of iron and steel, there is no improvement in the situation and indications point to a more pronounced scarcity owing to the steady increase in demand for steel for war purposes. The mills are booked up for many months ahead and are unable to take care of all the domestic requirements notwithstanding the falling off in demand. Furthermore during the hot weather, the output of the mills was reduced.

Owing to the intense heat in the United States, the production of sheets has been considerably reduced making it difficult for manufacturers to maintain shipping schedules. The American Government demand for sheets is considerably greater than was anticipated and is absorbing practically the entire output of the mills. Prices on black and blue annealed sheets are nominally unchanged. The Government demand for steel plates for ship construction is so great that the mills are unable to consider any private inquiries. Prices of plates are unchanged and entirely nominal. In the United States market there is a more pronounced tendency towards lower prices although there have been as yet few important declines. Opinions differ as to the ultimate effect on the market of the Government action with regard to price fixing and the trade is awaiting developments. Buying of steel has been in small volume owing to the uncertainty of price fixing and Government needs, etc. On this account another decline in unfilled tonnages is expected when the figures are published.

Pig Iron

The pig iron market in the States continues dull and business is practically at a standstill. Consumers are keeping out of the market for the present until

Government policy is known regarding pig iron prices. It is understood that the leading selling interests are holding firmly to prices quoted before the period of intense dullness started, but are not actively seeking business. Prices generally are unchanged and entirely nominal. The local situation is unchanged and no quotations are available.

Scrap

The scrap market is dull and featureless due to a lack of buying activity and general dullness in all metal markets. A resumption of activity is looked for in September which if it materializes may result in an upward movement in prices. There is a shortage in most lines of available scrap which is helping to support the market.

Machine Tools

The market is quiet which is to be expected at this time of the year. The situation in the States continues to occupy the attention of the trade. The export demand in the States is heavy while increasing activity due to the war

MARKET LETTER DEVELOPMENT

The attention of metal working plant executives is directed to the enlargement of the scope and usefulness of our Market Letter Department. In New York and Pittsburgh, expert correspondents have been engaged, and are already furnishing each week concise reports of production activities, price movements, etc., within the territory served by each of these important centres. During the next few weeks, further additions will be made to the number of our United States correspondents, embracing other industrial centres, and enlarging thereby the scope of the meantime service being rendered.

is noticeable. Prices continue very firm and deliveries backward.

Supplies

Prices of machine shop supplies continue to hold firm with a possibility of advances on some lines. Prices of gasoline and oils are firm and the market strong. The production of crude oil is again falling behind consumption of oil products and a much greater shortage will exist later as the American Government will be a big purchaser of oil supplies. It is inevitable that higher prices will exist sooner or later for oil but at the present time producers are endeavoring to keep prices down.

Metals

Although the metal markets continue dull, a better feeling prevails as it is now believed that the American Government will not be too drastic in regard to fixing prices on its requirements. It is understood that the Federal Commission

will avoid doing anything that might hurt the metal industries. Consumers continue to keep out of the market until the situation clears and buying has been of small volume. Copper is firmer as a shortage of metal will likely result from the recent strikes. Prices of all metals are unchanged on the basis of last week's quotations.

Copper.—While copper prices are firm, the market continues dull. The larger producers are not inclined to take contracts at present prices owing to the existing shortage and also because of the uncertainty as to how much more output is to suffer because of the strikes. The intense heat wave has affected both output and consumption. Local prices of copper are unchanged and nominal, lake and electrolytic being quoted at 35c and castings at 34c per pound.

Tin.—The market is dull and prices nominally unchanged. Local quotation on tin is 63c per pound.

Spelter.—The spelter situation is unchanged, the market being dull but firm. Spelter is quoted at 11c per pound.

Lead.—The market is dull but prices are firm. Government buying is a feature of the lead market. Local price 13c per pound.

Antimony.—The market is firmer, especially on future deliveries which are in fair demand from consumers. Antimony is quoted unchanged at 20c per pound.

Aluminum.—Trading in aluminum has been quiet. Consumers are buying sparingly and only for immediate needs. Local price 64c per pound.

Sydney, N.S., Aug. 2.—An explosion which occurred in No. 12 Colliery of the Dominion Coal Company at New Waterford, on the morning of the 25th July, caused the death of 62 of the men who were in the mine, and the death of three members of the rescue parties. The area of the explosion was very restricted, but the destruction within that area was very complete. Only one side of the mine was affected, and the haulage of the main deeps and the east side of the mine were entirely unaffected by the explosion. The colliery is largely in submarine territory, is quite damp and cool, and is not considered to rank as a gassy mine. The ventilation was restored to its normal conditions within ten hours of the explosion, and all the bodies were recovered by the evening of the second day, a fact that reflects much credit on the workmen and officials of the company, who worked with great bravery under conditions of great danger without rest or sleep.

Only one other explosion in Nova Scotia has caused a greater loss of life, namely, the explosion at the Springhill Mines in 1891, where 125 men lost their lives. At the Drummond Colliery in 1873 the loss of life was 55 men. The Dominion Coal Co. have had only one explosion previously, namely, the Caledonia explosion in 1894, which caused the death of 11 men. The Caledonia explosion was really the result of a fire, and can hardly be classed as a gas explosion.

The loss of 65 men, apart from the

tragedy itself, and the loss suffered by the dependents and relatives of the deceased men, is a serious factor in coal production, and will mean a reduction of at least 5,000 tons a month in outputs. There is also a general unsettling of the workmen by such an accident that will for some time reduce production. As a result of the accident the mines were generally idle from the date of the explosion until after the interments, and the production for July is much reduced in consequence.

The Nova Scotia Workmen's Compensation Act makes very full provision for the dependents of the men who have been killed, a widow and children receiving up to a maximum of \$40 per month until death or re-marriage, and as modified by the children reaching the age of 16 years. Fortunately, a large proportion of the men killed were unmarried and leave no dependents. The company is relieving all occurrences of distress that financial aid can touch, pending the adjustment of the compensation claims by the Compensation Board.

New York, Aug. 6.—Manufacturing industries throughout the United States are humming with work mainly to satisfy the needs of the home Government. Time is an essential element, where army and navy requirements are concerned, and many commercial orders are being set aside until the war pressure is relieved. Although the Government has not actually commandeered plants of tool makers, the orders placed are so heavy that not a few of the larger concerns are virtually under Government control and everything possible is being done to expedite output and shipments.

The Government has at last turned its attention to the dire need of providing heavy artillery to protect the country, and in anticipation of an appropriation of \$2,000,000,000 to secure heavy ordnance, the Government has called upon the Bullard Machine Tool Co. of Bridgeport, Conn., to build a \$10,000,000 plant extension for the construction of heavy artillery. The large tools required to be installed in this plant will probably be built by the Bullard Co. itself. One contract calling for the expenditure of \$1,500,000 for big machines to be installed in navy yards and arsenals has been placed, and the Ingersoll-Rand Co., manufacturing machine tools, has been awarded a contract for shells and large guns. This company is seeking to sublet a contract for 8-foot guns of four-inch bore.

One of the most interesting developments is the intention of the United States Government to purchase \$2,000,000 worth of machine tools and machinery to be installed in railroad repair shops in France. Through the Pennsylvania R.R. Co., the Government has already taken bids on a number of machine tools, which it is proposed to ship to France on the transports which will carry the railroad engineering contingent of the United States army. These tools are urgently needed for prompt delivery and, if necessary, the tools will be

commandeered; prices were asked f.o.b. New York, Philadelphia and Newport News.

The Emergency Fleet Corporation, on behalf of the Government, has taken over all of the steel ships of 2,500 tons burden or larger, now building in twenty-five shipyards of the country. The tonnage taken over is reported to be 1,500,000; probably about 600 boats are included, which are under construction mainly for Great Britain and Norway. Work is to be rushed on these vessels through Government power. By commandeering ships on the ways, the Government is placed in a position where it must guard the contractors against loss, which may be involved in the expense incurred by employing extra shifts of workmen and through payment for overtime. The burden and responsibility of securing labor and dealing with labor interests is assumed by the Government. As labor must now deal with one Federal agency, controlling conditions at all shipyards, the danger of complications is avoided.

The Federal Shipbuilding Co., the new subsidiary of the United States Steel Corporation, has already placed contracts for some machinery; has had other tools built at the Pencoyd shops of the American Bridge Co., and is now taking bids on cranes, hoists and machinery for the new plant near Newark, N.J. Fourteen shops will be built at this plant, and \$2,000,000 will be expended on machinery alone. The keel for the first boat will probably be laid down early in December. Twenty-eight hoists will be bought for the plate and angle shop alone; most of the boring and punching tools are being built at the Pencoyd shops. Eight other shipyards in the East are placing orders for machine tools and electrical hoists.

In the export field the principal contract closed amounts to several million dollars for tools to be installed at the \$20,000,000 plant of the Tata Iron & Steel Co., Sakchi, India. Large orders have also been placed for Russia and Italy, and one \$800,000 order for a tube and pipe works in Japan.

Pittsburgh, Pa., Aug. 4.—The market has continued stagnant in all departments. Neither buyers nor sellers evince the least desire to bring matters to a head, and apparently all are content to wait for months, if necessary, until the market shows a disposition to find its level. Everyone admits that prices cannot possibly advance on any product, but no one has any idea when actual declines will begin. Of course, at the height of the summer season there would be little disposition to make engagements in any event.

In the case of steel products the market will presumably readjust itself to a trading basis after the bulk of the present engagements has been filled. Provided no extraneous influence, as by action of the Government, interferes. The obligations now on the books of the Steel Corporation are equal to its output for eight and a half months, the bookings, of course, being proportionately heavier in

some departments and lighter in others. The large independents as a rule are not booked as heavily, while the small independents have still lighter tonnages. On this basis a readjustment in the general market might not be forced before December. This would be according to precedent, but conditions are quite different from those that have hitherto obtained at the end of a period of price advances, because there is relatively little tonnage on books at the prices lately quoted as the market, the heavy forward buying having stopped about last April, and the buying since then having been chiefly for early deliveries.

Government Orders

The Government has placed orders for 150,000 tons of rails—90,000 tons with the Steel Corporation and 60,000 tons with three independents, all for delivery by October 1 for American railways in France in connection with the military operations. The price is \$38 for Bessemer and \$40 for open-hearth, at the option of the mills, these being the present official prices, after the two \$5 a ton advances made last year. The mills have not been sellers for several months, however. A fortnight ago orders were placed for 300 locomotives to operate on the prospective line, which will involve about 1,200 miles of track, the rails being 80-pound section. Some inquiry is now appearing for cars to operate on the lines, one for 17,000 four-wheel gondolas, 12 metric tons capacity, being mentioned in this connection.

These rails were bought at a fixed price, not subject to revision in future. On the offer of the mills last March to cover some 425,000 tons of steel for the 1917 naval programme—2.90c for plates and 2.50c for shapes and bars—it appears now that about 600,000 tons was allotted. Then there were some 85,000 tons of shell steel rounds placed at 3.75c, and there were also some tonnages of pipe, as well as some early tonnages of sheets, placed at fixed prices. All other steel buying has been either without any price being named or with merely a tentative price named, subject to revision. Eventually President Wilson will fix prices for the steel on which the price has been left open, as well as steel to be ordered in future. Indications are that the cost report of the Federal Trade Commission will be made in a fortnight or so, and the President's action will probably follow promptly.

It is expected that the settlement of Government prices will have an influence in pulling down the general steel market, though perhaps not at the outset. It remains somewhat of a question what prices will be made upon steel required by the European Allies, as the law empowering the Government to fix prices on its own purchases is not entirely specific on that point.

Cars and Locomotives

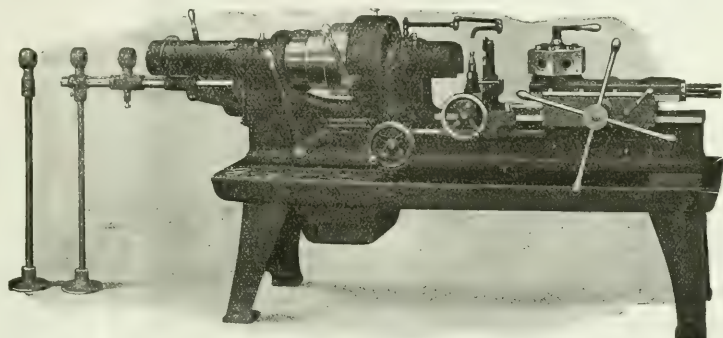
Freight car orders placed in July totaled about 5,670 cars, when 10,000 to 20,000 may be taken as a fair range in moderately active times. Only 2,325 cars were ordered by the public roads, there having been 1,800 bought by in-

(Continued on page 62.)

Warner & Swasey Screw Machines

For large output and close limits—If you are figuring on screw machine work you can depend on W. & S. machines being right for the job.

We can supply you from stock immediately.



The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

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TORONTO

Let the Boss Know It!

IF you are a reader of Canadian Machinery, go tell your employer about it some convenient time! You couldn't tell the up-to-date manufacturer anything that would please him more. He would know that you are abreast of the times; that you are ambitious and interested in your work; that you are acquainted with methods and machinery which make for greater efficiency. He will say softly to himself: "Here is a live wire,—I'll just keep my eye on that chap."

If you are not a regular reader it will pay you to become one right away—quick.

Subscription price—\$3.00 per year. 52 issues.

If any advertisement interests you, tear it out now and place with letters to be answered.

INDUSTRIAL ^A_N^D CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

ENGINEERING

Hamilton, Ont.—The Hamilton Steel Wheel Co. are building an extension to their plant.

Hamilton, Ont.—Fire in the tempering plant of the Dominion Steel Foundry on July 30 did about \$2,000 damage, which is covered by insurance.

Toronto, Ont.—British Forgings, Ltd., have taken out a permit to erect a steel and concrete shop, to cost \$61,000, and a machine shop to cost \$9,000. The plant is located at the foot of Cherry Street, Ashbridge's Bay.

Calgary, Alta.—An engineering department will be added to the Institute of Technology and Arts by the Provincial Government. The Provincial Architect, Parliament Building, Edmonton, has charge of the work.

Hamilton, Ont.—The Semet-Solvay Co., has engineers here reporting on a project to erect a \$2,000,000 coke oven plant. The plant will be erected by the Hamilton By-Products Coke Oven, Ltd. It will have a capacity of about 900 tons of coke a day, and seven million feet of

gas. Stripes Inlet is the site that has been chosen.

ELECTRICAL

Kingston, Ont.—The Hydro-Electric engineers have recommended the purchase of a motor-generator set to be installed at the Street Railway Co. plant.

Cobourg, Ont.—Residents of Grafton and of Haldimand Townships are applying through Haldimand Township Council to the Hydro-Electric Commission for light and power. The Council instructed the clerk to forward their request and make enquiries as to cost of construction and rates.

MUNICIPAL

Petrolia, Ont.—The Town Council will build a pumping station at a cost of \$15,000.

Winnipeg, Man.—The City Council will build an extension to the power plant at Lac du Bonnet.

Port Hope, Ont.—The by-law to give the Nicholson File Co. a fixed assessment carried by a large majority.

Woodstock, Ont.—The ratepayers will vote on a by-law on August 10 to authorize the installation of a mechanical filtration plant.

Strathroy, Ont.—Tenders have been received for pump houses and a concrete reservoir. Kery & Chase, Ltd. of Toronto are the engineers.

Smith's Falls, Ont.—A by-law will be voted on by the ratepayers on August

22 to decide the question of obtaining power from the Hydro-Electric Commission.

Tottenham, Ont.—A by-law will be submitted to the ratepayers on August 14 to vote on the question of installing a Hydro-Electric system in the village.

Smith's Falls, Ont.—The ratepayers will be asked to vote on a by-law on August 22 to authorize the issue and sale of debentures to raise the sum of \$135,000, for the purchase of the plants and businesses of the Citizens' Electric Co. and the Smith's Falls Electric Power Co.

St. Lambert, Que.—The third reading of the by-law granting the Dominion Textile Co. a cash bonus of \$95,000 in lieu of a free site, and also an exemption from general taxation for a period of twenty years was unanimously passed by the Town Council. The by-law will be put to the vote of such ratepayers as are proprietors, on August 20. The first building to be erected by the company will, it is understood, cost \$2,000,000.

TENDERS

Strathroy, Ont.—Tenders are requested for direct connected motor-driven

PUMPING EQUIPMENT REQUIRED

Tender forms, specifications and drawings have been received from D. H. Ross, Canadian Trade Commissioner, Melbourne, for the supply and delivery of pumping plant and equipment for the Commonwealth naval dockyard, Cockatoo Island, Sydney, N.S.W., and are open for inspection at the Department of Trade and Commerce, Ottawa (refer to File No. A-1901). Tenders addressed to either the Director of Navy Contracts, Navy Office, Melbourne, or the Director of Naval Contracts, care Commonwealth Naval Dockyard, Cockatoo Island, Sydney, N.S.W., close on October 10, 1917. The particulars are as follows:

Two main dock pumps with vertical spindle motors and control equipments.

One vertical spindle motor and control equipment.

Four sluice valves with four motors and control equipment.

Two drainage pumps with motors and equipment.

Two air exhaust pumps with motors and equipment.

One enclosed motor and equipment for dock caisson.

PITTSBURG MARKETS

(Continued from page 168.)

Industrial roads, some 345 cars by private shippers and 1,200 by foreign buyers. Locomotives ordered in July totaled 448, but 300 were by the United States Government and 100 by the British War Office, leaving only 48 for all other buyers.

Pig and Scrap Declining

Scrap is always much more ready to yield to a declining influence than finished steel products. Heavy melting steel delivered Pittsburgh reached its top point the third week in June at \$47, while it is now about \$31. Pig iron, while extremely inactive, has had enough action to indicate a general declining tendency, although the declines up to date are very small. A sale of 1,000 tons of basic for prompt shipment has been made at \$52, valley, when \$53 to \$54 was the recognized market at the close of June, and that for extended delivery. Pig iron may be regarded as on the down grade, although moving very sluggishly.

AUXILIARY MACHINERY REQUIRED.

Tender forms and specifications have been received from D. H. Ross, Canadian Trade Commissioner, Melbourne, for supply and delivery of auxiliary machinery for the Flinders naval base, via Melbourne, Victoria, and are open for inspection at the Department of Trade and Commerce, Ottawa (refer to File No. A-1901). Tenders addressed to the Director of Navy Contracts, Navy Office, Melbourne, close on October 24, 1917. The particulars are as follows:

Two electrically-driven air pumps, with complete set spare parts.

One steam driven air pump, with complete set of spare parts.

Two small circulating pumps.

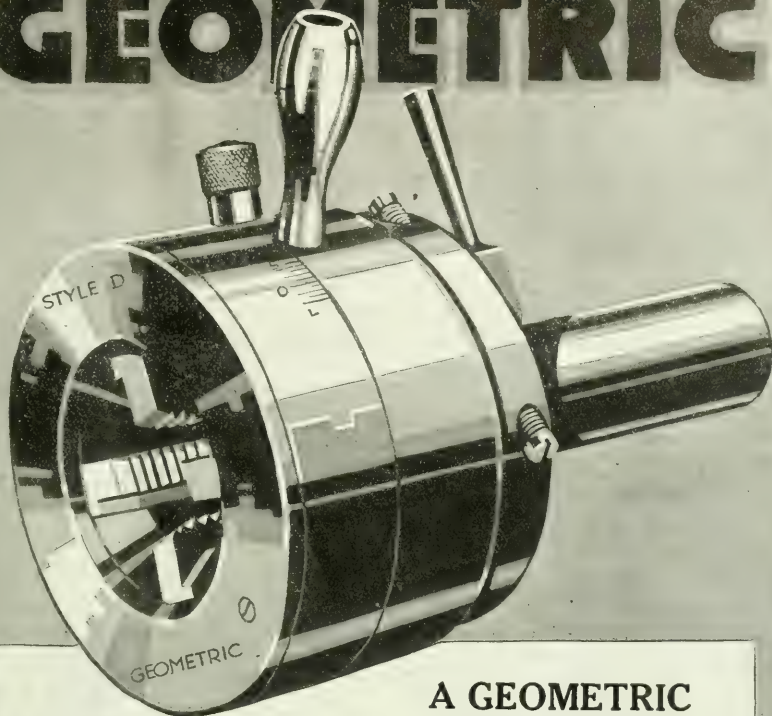
One large circulating pump.

One large feed pump, with complete set of spare parts.

One small feed pump, with complete set of spare parts.

One oil fuel pump with complete set of spare parts.

GEOMETRIC



A GEOMETRIC DIE HEAD

THE MONARCH OF THE SCREW-CUTTING INDUSTRY

For nearly a quarter of a century Geometric Die Heads have been steadily increasing production for the user and increasing business for themselves. Every Geometric Die Head sells another.

Inquire of the established users of Screw Machines and Turret Lathes, and get their opinion of the Geometric Die Heads.

Whatever your threading problem, there is a Geometric Die Head to solve it—in the most economical way.

Why should you not take advantage of the Geometric method of Screw Cutting? Whenever you are ready to take up your threading proposition with us, you will find us ready to advise with you.

THE GEOMETRIC TOOL COMPANY NEW HAVEN CONNECTICUT

Canadian Agents: Williams & Wilson, Ltd., Montreal; The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, and St. John, N.B.

If any advertisement interests you, tear it out now and place with letters to be answered.

turbine pump, 80 Imperial gallons capacity, against a head of 20 feet. For full particulars, apply Public Utilities Commission, Strathroy, Ont.

Hartney, Man.—Tenders will be received up to August 13, for electric meters, transformers, wires, generators, switchboards and oil engine for the town of Hartney. Plans and specifications are available at the office of the Public Utilities Commission, 201 Tribune Building, Winnipeg.

Toronto, Ont.—Tenders addressed to the Secretary of the Board of Education, will be received until August 10, for steam-fitting, plumbing, tinmith work and other trades required for mid-summer repairs. Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, Administration Building, 155 College St., Toronto.

St. John, N.B.—Tenders will be received until August 31, for the construction of an extension of and repairs to the Negro Point breakwater, St. John Harbour, St. John County, N.B. Plans and forms of contract can be seen and specifications and forms of tender obtained at the Department of Public Works, Ottawa, and at the offices of the District Engineers at St. John, N.B.; Halifax, N.S.; Shaughnessy Building, Montreal, P.Q., and Equity Building, Toronto, Ont.

Ottawa, Ont.—Tenders will be received until August 27 for plumbing pipes and fixtures required in the reconstruction of the Parliament Buildings. All tenders to be based on the execution, erection and completion, including all labor and materials required for the installation of the plumbing system, together with all fixtures, appliances and appliances as called for in the plans and specifications. Plans, specifications and any other information can be obtained at the office of the general contractor, P. Lyall & Sons, Construction Co., Ottawa.

GENERAL

Kingston, Ont.—Fire on July 31 did \$16,000 damage at the W. F. Kelly Oil Co.'s plant here.

London, Ont.—The London Art Woodworking Co., will build an addition to its factory and a boiler house at a cost of \$15,000. Joseph Keller as manager.

St. Lambert, Que.—It was stated informally at a Council meeting held here recently, that a factory for making rubber tires will be established.

Tilbury, Ont.—It is reported that a company has been formed to establish a factory here for making porcelain goods for electrical purposes.

Glencoe, Ont.—The Woodburn flour mill, with a large stock was burned to the ground on July 31. The loss was \$40,000, covered by insurance.

Quebec, Que.—The storm which raged in this district last week did enormous damage which will, it is estimated aggregate over \$2,000,000. Losses to lum-

ber corporations alone will probably total \$1,000,000, the remainder being made up in damage to the Quebec Central Railway, the Levis-Jackson highway, to bridges and to private property, crops and houses.

INCORPORATIONS

The William Lyall Shipbuilding Co. has been incorporated at Ottawa with a capital of \$1,000,000 to build ships of all kinds. The head office is at Montreal, and the incorporators are: E. Lanquedoc, R. E. Allan and W. Taylor, all of Montreal.

The McKinnon Steel Co., has been incorporated at Ottawa with a capital of \$500,000 to take over the business of McKinnon Holmes & Co. of Sehbrooke, Que. The incorporators are G. D. McKinnon, Alex. McKinnon and F. C. Johnson all of Sherbrooke.

Empire Stove & Furnace Co., has been incorporated at Ottawa with a capital of \$100,000 to manufacture stores, furnaces and heaters, etc., at Owen Sound, Ont. The incorporators are A. A. Parks, A. J. Creighton and E. W. McQuay all of Oken Sound, Ont.

The Sydney E. Jinkins Co., has been incorporated at Ottawa to carry on business as engineers and contractors with head office at Montreal and capital of \$400,000. The incorporators are S. E. Jinkins, H. R. Drummond-Hay and A. J. Milligan all of Winnipeg.

Quebec Charcoal Co., has been incorporated at Ottawa with a capital of \$50,000 to manufacture charcoal and wood alcohol. The head office is at Montreal and the incorporators are A. Wainwright, C. G. Ogden and G. V. Cousins all of Montreal.

The Dominion Carriage Co., has been incorporated at Ottawa with a capital of \$500,000 to manufacture carriages and vehicles of all descriptions at Montreal East, Que. The incorporators are P. T. Legare, J. H. Fortier and P. W. Fortier all of Quebec.

PERSONAL

Prof. Brydone-Jack, of Winnipeg, formerly on the staff of the Manitoba University, has been appointed superintendent of engineering for Western Canada, under the Department of Public Works, Ottawa.

C. Royer, for several years manager of the L'Air Liquide Society, Montreal, has severed his connection with the firm. He contemplates starting as a consulting engineer in the oxy-acetylene process of cutting and welding in general engineering practice.

J. A. Hossack, of Toronto, sales manager of the Lufkin Rule Co., Windsor, Ont., has returned home after a trip across Siberia and Russia. Mr. Hossack had the enviable and exciting experience of spending seven weeks in Russia during the most eruptive period of its history.

W. G. Jarman has tendered his resignation as general manager of the Briscoe Motor Co., Brockville, Ont., and expects to leave shortly for the Canadian West.

G. Palmer Howard, manager of the Phoenix Bridge & Iron Works, has left Montreal for Washington. Mr. Howard has been chosen to act on the British Imperial Munitions Board.

C. Wheeler, for the past two years general superintendent of the St. Lawrence Iron Foundry, and also the St. Lawrence Machinery Co., recently incorporated, has resigned his position. The strenuous work of the past year has necessitated Mr. Wheeler taking a well-earned rest.

CONTRACTS

Port Arthur, Ont.—The Canadian General Electric Co. has secured the contract for the sub-station and electrical equipment for the Eastern Terminal Elevator.

Montreal, Que.—The A. B. See Electric Elevator Co. of this city have been awarded a contract for the elevators for an office building for the Norlite Realty Co., Ottawa.

Niagara Falls, Ont.—Plans have been prepared and general contract let for a factory to be erected here for the Herbert Morris Chain & Hoist Co. of Toronto. The Toms Contracting Co. of Toronto are the contractors.

Kingston, Ont.—At a meeting of the Utilities Commissioners the contract for the erection of the new concrete gas holder, which will be located at the corner of King and Place D'Armes Street, was awarded to the Kingston Construction Co. for the sum of \$8,999.

BUILDINGS

Toronto, Ont.—S. & L. S. Yolles will erect a five-storey brick warehouse at 443 Wellington Street at a cost of \$65,000.

Toronto, Ont.—The Canadian General Electric Co., have obtained a permit to erect a new warehouse on King street, west, at a cost of \$100,000. Excavation for the foundations has been started.

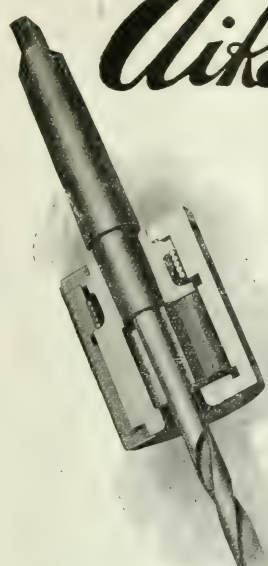
REFRIGERATION

Courtney, B.C.—The new general store of the Comox Co-operative Society has been equipped with a 1-ton "Armstrong" refrigerating plant.

Vancouver, B.C.—Howard's chocolate factory has been equipped with a ½-ton refrigerating machine, furnished by the Armstrong Machinery Co., Spokane, Wash.

McLeod, Alta.—The meat market of P. Burns & Co., at McLeod, has been re-modelled and equipped with a 1-ton refrigerating plant, furnished by the Armstrong Machinery Co., Spokane, Wash.

Swanson Bay, B.C.—A 3-ton refrigerating plant, furnished by the Armstrong Machinery Co., Spokane, Wash., has been installed on the premises of the Empire Pulp & Paper Co., at Swanson Bay.



Aikenhead's New Chuck

Will stop you losing your drilling profits

Minutes mean profit—are you losing minutes? There is no loss of time in tool changes when you use a

WAHLSTROM CHUCK

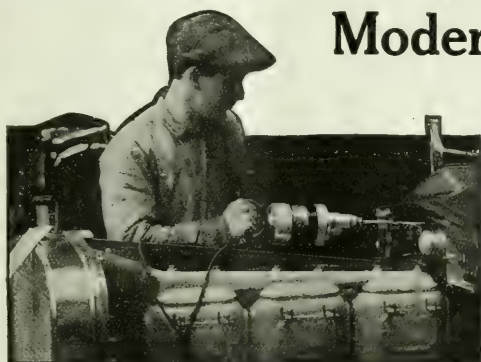
It is entirely automatic in its action — tool changes may be made without stopping the spindle—just grasp the shell of the chuck with one hand and make the tool change with the other. The change is made in a tenth of the time required with the ordinary chuck—and the tool automatically centers itself.

The Wahlstrom comes in two types—one for straight shank tools—the other for Nos. 1, 2 and 3 M.T. shank tools—they are both "Production Increasers," which demands your attention. Write for information now.

AIKENHEAD HARDWARE LIMITED

17, 19, 21 Temperance Street - Toronto, Canada

Modern Drilling Methods



By constructing the "Van Dorn" Portable Drill 100% overstrength, we have made great strides in promoting the efficiency and utility of a shop.

The "Van Dorn" Universal Portable Drills consume power only when in operation, and may be attached to any lamp socket.

The special fan-cooled "Van Dorn" motor is capable of 100% overload.

The switch is quick acting.

Sticking and fusing of contacts practically eliminated.

Phosphor bronze and ball bearings. Hardened gears.

We will gladly forward any information you may desire regarding portable drills, grinders, blowers, die filers, riveters, etc. Write us to-day.

Aikenhead's

17, 19, 21, Temperance Street
TORONTO, ONTARIO, CANADA

Canada's Leading Tool House

If any advertisement interests you, tear it out now and place with letters to be answered.

HAWK D CHROME VANADIUM STEEL

Will
Give You
Exceptional

Shell Forging Production

WITHOUT AN EQUAL FOR
BOTH FIRST AND
SECOND OPERATION
PUNCHES.

Comes to you heat-treated
and ready for use.

It does not stick to the
work.

There are many cases where
each punch has turned out
over 2,000 shells.

It means more shells, per
machine per day.

STEEL OF EVERY
DESCRIPTION.

**Hawkrider Brothers
Company**

303 Congress St., BOSTON, MASS.
U. S. A.

THE IRON WORKS LIMITED

Successors to

Owen Sound Iron
Works

Owen Sound,
Ont.

Engineers

Boiler-
makers

Founders

Machinists

Tank Work
Smoke Stacks,
Grey Iron and
Brass Castings,
Special
Machinery
Made to
Order

TRADE GOSSIP

The American Steel Export Co. of New York, has appointed Woodburns, Ltd., of Montreal, exclusive agents for Ontario and Quebec.

The Terminal Warehouse Co. have opened a new storage warehouse at 588 King Street, Toronto, with a floor space of over four thousand feet. C. Vail is the general manager.

Steel Exports Stopped from U. S.—A despatch from Washington states that President Wilson has forbidden export of any iron and steel plate, pig iron, iron and steel scrap, and steel billets from the United States, except such as the Allies need for "actual war purposes." Other iron and steel products are allowed to be freely licensed, but only to the Allies.

The North Shore Ironworks of North Vancouver are putting on the market a ship's winch similar to the type made by Clarke, Chapman & Co., Gateshead, England. The North Shore Ironworks are now under contract with the Imperial Munitions Board for sixty of these winches and eleven windlasses. They are also making winches for Coughlan & Sons, the Wallace Shipyards, and a concern at Portland, Ore.

St. John, N.B.—The Dominion Department of Marine and Fisheries has offered to arrange for steamers of 2,000 or more tons' capacity to bring anthracite coal here for New Brunswick use, if dealers arrange to have the coal ready at an Atlantic port on certain dates. The question of finding facilities at St. John to handle coal steamers of that size without eating up the expense saved in transportation is now engaging attention.

Customs Revenue Shows Increase.—Customs receipts for the month of the fiscal year, which closed July 31, show substantial increases over the like periods of 1916. The Customs revenues of Canada in the month just ended amounted to \$14,269,643.92, or \$3,187,749.57 more than in July, 1916. Receipts from the same source during the four months ended July 31st, 1917, aggregated \$60,949,847.64, as compared with \$46,513,299.22, an increase of \$14,436,548.42.

Heavy Fire Losses in Ontario.—The average fire waste in Ontario for the first six months of this year is, according to the Fire Marshal, practically \$1,000,000 per month. The insurance on these losses for the six months amounted to \$4,518,792, while there was a loss of \$1,469,522 not covered by insurance. In June there were 216 fires caused by lightning, and these did \$57,466 damage. The greatest loss was experienced, in February, when there were 1,020 fires, which did damage to the extent of \$1,369,139.

G. T. P. Acquires New Steamship.—The Grand Trunk Pacific has added another ship to its North Pacific Coast fleet. This is the S.S. "Tillamook," which has been placed in service between Prince Rupert, the Western terminal of the G. T. P. line and Ketchikan, Alaska. This vessel is of United States registry,

119 feet in length, 29 feet beam, has a cargo capacity of about 450 tons, and good passenger accommodation. It will meet the growing demands of the Northern trade in handling fresh fish, in handling supplies to canneries, and in looking after general trade.

New Nickel Plant.—President Monell of the International Nickel Co., states that work on the new refinery at Port Colborne, Ont., is progressing rapidly and the new \$5,000,000 plant will be ready for production by the beginning of 1918. Initial production of this plant is placed at 20,000,000 pounds a year, which increases the output one-third and brings the total capacity to 80,000,000 per year.

Hydro Commission Takes Over Power Co.—The Hydro-Electric Commission on Aug. 2, formally acquired the plant of the Ontario Power Co., the largest and most efficient developing plant on the Canadian side of the Niagara River. This plant was purchased some months ago by the Commission for \$22,000,000, and it will form, an important link in the Chippawa Creek development scheme, the ultimate capacity of which will be 900,000 horse-power.

Demurrage Rates Raised.—With the object of speeding up traffic and getting more coal into Canada, a new set of demurrage rates has been drawn up by the Board of Railway Commissioners, as follows: First and second day, free; third day, \$1; fourth day, \$2; fifth day, \$3; sixth day, \$4; seventh day and all days thereafter, \$5 a day. The present scale allows for a fixed rate of one dollar a day after the expiration of free time, which varies according to the commodity. The railways' proposal was a rate of \$3 a day after expiration of free time.

Important Customs Tariff Alteration.—The traffic department of the Canadian Manufacturers' Association has issued the following Order-in-Council: "During the period of the war, until otherwise ordered, Customs duties on imported goods subject to an ad valorem rate may be accepted by collectors of Customs in Canada at fair market value of the goods at the time of purchase in the country whence exported directly to Canada, with an addition to such value of not more than twenty-five per centum when imported within nine months from the date on which such goods have been contracted for or ordered to be shipped to Canada, notwithstanding any greater advance in the value of the goods prior to their exportation to Canada."

MARINE.

Vancouver, B.C.—The Wallace Shipyards, Ltd., on July 27, laid the keel of the second steel steamer, which will be a sister ship to the War Dog, which underwent her trials the previous day. The War Dog is back at the shipyard carrying out the final jobs before proceeding to sea.

Halifax, N.S.—News has been received here of the sinking of the Dominion Iron & Steel Co. steamer Heathcote in the Gulf of St. Lawrence on July

26. She was in collision with a Dutch steamer, which escaped with slight damage, and succeeded in rescuing the entire crew of the Heathcote. The Heathcote was loaded with limestone from Port-Au-Port to Sydney. She was of 2,345 tons gross, registered in Sydney, N.S., and was built in Sunderland in 1898.

WOODWORKING

Three Rivers, Que.—The Three Rivers Box Co. will build a factory here.

Victoria, B.C.—Planing mill and box factory owned by Cameron Lumber Co., have been destroyed by fire. Damage is estimated at \$100,000.

Fergus, Ont.—John Watson will erect a saw mill to cost \$10,000, to replace the one recently destroyed by fire. New machinery and equipment will be required.

RAILWAYS—BRIDGES

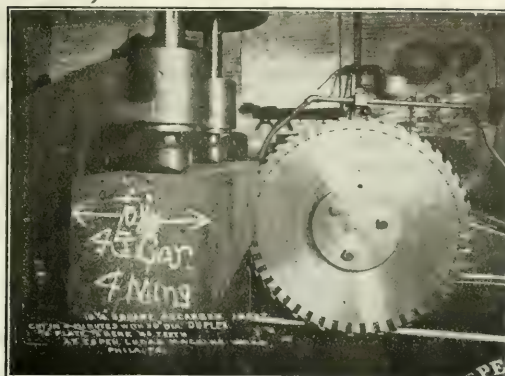
Cobourg, Ont.—The work has been commenced at Campbellford of elevating the G. T. R. bridge sufficiently to permit boats to pass through the canal. Thomas Jarro, G. T. R. superintendent, is in charge, and the cement work will be done by contract.

CATALOGUES

Air Compressors.—Bulletin K-500-A, illustrating a line of power driven, single stage, straight line air compressors manufactured by the Canadian Ingersoll-Rand Co. of Montreal. These machines are designed for motor or belt drive and are furnished with a special short belt drive where floor space is a consideration. They are intended for use in industrial and mining plants where units of 950 cu. ft. displacement and under per minute are required. Eighteen sizes are built giving a wide range of choice. "Circo" leaf and self-contained construction of this type of compressor are fully described.

Export Engineering and Contracting is the title of a 94 page iron and steel catalogue now being distributed by the American Steel Export Co., New York. This is the English edition but others are being prepared in Russian, Spanish, French, Portuguese and Italian, and will be published shortly. This catalogue contains much information, such as weights, and measures in English and metric tables, and data covering, such products as pig iron, billets, blooms, slabs and sheet bars, plates and shapes, tool steel, merchant bars and agricultural steel, wire products, pipe and tubing, rails and railway supplies, castings and forgings, sheet and tin plate, etc. The object of this catalogue is to inform overseas buyers concerning American sizes, weights, etc., and the booklet also includes specifications covering tolerances and other valuable data.

The "F. M. Book."—Even those best acquainted with the Canadian Fairbanks-Morse Co. will be surprised at the very wide range of goods shown in their new general catalogue, which they have called



**Circular
Metal
Cutting
Saw
Blades for
Any Type
of
Machine**

Let us demonstrate what a saving can be made by installing a
HUNTER "DUPLEX" Inserted Tooth Blade

Write for information
HUNTER SAW & MACHINE CO., Pittsburgh, Pa., U.S.A.

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R. SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE --- WORKS, MUSKOGEE HEIGHTS, U.S.A.

OVENS
Enameling and Varnishing Ovens heated
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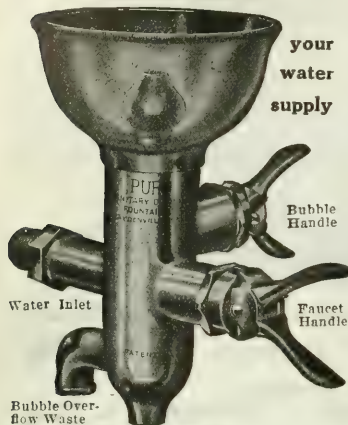
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War Ships, by Edward L. Attwood, M.I.B.A., 338 pages, 8½ x 5½ in., 209 illustrations. Published by Longmans, Green & Co., London and New York. Price \$4 net. This is the sixth edition of a book on the construction, protection, stability, turning, etc., of war vessels written primarily for naval officers, but it is also a work that will prove a useful introduction to the study of naval architecture for apprentices and students at naval dockyards. To achieve the purpose for which it was written the matter is necessarily technical, but at the same time is presented in a practical and comprehensive manner. The book contains twenty-three chapters and two appendices. Briefly, the chapters deal with the following subjects: The strength of ships, tests of steel, etc.; framing; beams, pillars and decks; plating, watertight doors and bulkheads; stems and sternposts, etc.; steering gears, pumping and drainage; ventilation, corrosion and fouling, armour protection, rules of mensuration, navy list displacement, buoyancy, initial stability, trim, stability at large angles of inclination, rolling and turning of ships, resistance and propulsion of ships, design of war ships. The last chapter contains notes on the loss of H.M.S. Victoria. Appendix A consists of a series of questions, which in many cases are intended to lead to inquiry and discussion, and cannot be directly answered from the text. Appendix B comprises the important 1906 British Admiralty memorandum concerning the design of H.M.S. Dreadnought. A number of blank pages have been inserted at the end of the book to provide space to note particulars and details peculiar to the ship on which the officer is serving, and to note changes of practice which may occur. The book covers the subject thoroughly and contains a fund of valuable information for naval officers. In the chapter on armour and deck protection reference is made to a number of war ships now in commission. The text is printed in clear type, and is illustrated by a large number of carefully drawn diagrams. The book has a copious index, and is bound in substantial cloth covers.

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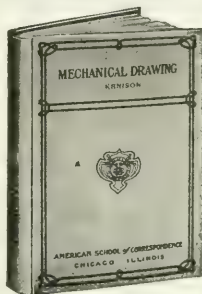
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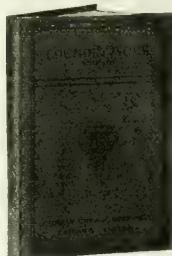


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 4-No. 0 Burke Bench Millers (new).

- DRILL PRESSES**
 1-3-spindle 8" overhang Henry & Wright High Speed Drill.
 3-Speed and Gifford High Speed Bench Drills.
 6-20" Buffalo Plain Drill Presses.
 4-6-spindle Fox High Speed Drill Presses.
 2-4-spindle Fox High Speed Drill Presses.
 3-Mueller Plain Radial Drill.
 1-4" Rickford Radial Drill, w. T.A.
 1-6" Mueller Plain Radial Drill.
 1-6-spindle Natick.

- SHAPERS AND PLANERS**
 1-24" Ohio H.D. B.G. Crank Shaper.
 1-24" New Bench Crank Shaper.
 1-24" Lodge & Davis Geared Shaper.
 1-18" Hender Geared Shaper.
 1-16" Hender Geared Shaper.
 1-16" Garvin Shaper.
 2-10" New Springfield B.G. Crank Shapers.

- PRESSES**
 1-Waterbury-Farrell Straight Sidel Geared Press with double cam knock-out.
 1-No. 10 Perkins Drawing Press.
 5-No. 2-W Bliss Wiring Presses.
 1-200 lb. R. & S. Roll Board Hammer.
 1-200 lb. P. & W. Roll Board Hammer.
 1-50 lb. Scanton Roll Hammer.
 1-25 lb. Pradley Helve Hammer.

- AIR COMPRESSORS**
 1-8 x 6 Westinghouse Steam Air Compressor.
 1-6 x 8 x 12 Twin Steam Pump Co. steam driven air compressor.
 1 10 x 10 Ingersoll Sargent Belt Driven Air Compressor.
 1-10 x 10-Taxton Belt Driven Air Compressor.
 1 8 x 8 Fairbanks-Morse Electrical Driven Air Compressor.
 1-8 x 8 Gardner Single Belt Driven Air Compressor.
 1-8 x 8 Union Steam Pump Co. Belt Driven Air Compressor.
 1-7 1/2 x 6 Chicago Pneumatic Tool Co. Belt Driven Air Compressor.
 1-6 x 6 Chicago Pneumatic Tool Co. Belt Driven Air Compressor.

We also carry a large stock of Steam Engines, Steam Pumps and Electrical Equipment of all kinds.

We are in the market to purchase machines tools both large and small.

RIVERSIDE MACHINERY DEPOT

17-29 St. Aubin Avenue
 DETROIT, MICH.

GOOD USED EQUIPMENT

ELECTRIC TRAVELING CRANES.

- 50-Ton, 61' 7" span, four motor, 550 volts, D.C.
 25-Ton, 46' span, four motor, 220 volts, D.C.
 25-Ton trolley, three motor, 220 volts, D.C.
 10-Ton, 40' span, 30' lift, three motor.
 2, 14 and 1 1/2 H.P. Shaw crane motors, 220 volts, D.C.
 10 H.P. Akron crane motor, 220 volts, D.C.
 10-Ton hand crane, 35' 6" span.
 20-Ton hand crane, 29' 6" span.
 2-Ton hand crane, 20' span.

PUNCHES AND SHEARS.

- Letter Shear (double), cap. 2" sq.
 3" throat (single), cap. 3/8 x 3/4" (belt).
 4" throat (single), cap. 1/2 x 1" (belt).
 4" throat (single), cap. 3/4 x 1" (steam).
 10" throat (single), cap. 1 1/2 x 1 1/2" (belt).
 10" throat (single), cap. 1 1/2" (belt).
 10" throat (single), cap. 3/4 x 3/4" (belt).
 17" throat (single), cap. 3/4 x 3/4" (belt).
 13" throat (single), cap. 3/4 x 3/4" (hand).
 10" throat (double), cap. 1 1/2 x 1 1/2" (belt).
 Angle Shear (double), cap. 6 3/8 x 3/4" (belt).
 Angle Shear (double), cap. 6 3/8 x 3/4" (belt).
 Plate Shear (single), 18" blade, cap. 3/4".
 Rotary splitting, 30" throat, cap. 5".
 Rotary bevel, 5" throat, cap. 1/2".
 Coulter & McKenzie, cap. 3 1/2", spring steel.
 Alignator, 7" blade, cap. 1" squares.
 Guillotine, Perkins, No. 6, cap. 2 1/2 sq.

MISCELLANEOUS.

- Acme Rivet and Upsetter, 1 1/2" cap.
 Bending Roll, 6", drop end, 6 1/2" and 8" rolls.
 Bending and Straightening Mill, 3" cap, 1" stroke.
 Cold Saw, Newton, 40" blade, two tables.
 Grinder, No. 10 B. & S. Plain.
 Grinder, No. 12 B. & S. Universal and Tool.
 Rotary Planer, 36", 24" and 18" cutters.
 First-class condition—quick shipments.
 Saw, cold, 28" blade, 48" travel.
 Press (trimming) No. 11 Perkins, 16,000 lbs.

McCoy-Brandt Machinery Co.

Office and Warehouse:
 216-218 Penn Ave., Pittsburgh, Pa.

Federal Machinery Sales Company

18 No. Jefferson St., Chicago, Ill.

Rebuilt Tools—Immediate Shipment

DRILLS.

- 2" Hoefler, upright, sliding head, b.g., p.f.
 2" Hamilton, sliding head, b.g., p.f.
 2-spindle 30" Barnes, gang, b.g., p.f.
 Silver, 20", wheel and lever feed (15), new.
 Silver, 20", bag, p.f., automatic stop (30), new.
 2" 1/2" 10" 12" 14" 16" 18" 20" 22" 24" 26" 28" 30" 32" 34" 36" 38" 40" 42" 44" 46" 48" 50" 52" 54" 56" 58" 60" 62" 64" 66" 68" 70" 72" 74" 76" 78" 80" 82" 84" 86" 88" 90" 92" 94" 96" 98" 100" 102" 104" 106" 108" 110" 112" 114" 116" 118" 120" 122" 124" 126" 128" 130" 132" 134" 136" 138" 140" 142" 144" 146" 148" 150" 152" 154" 156" 158" 160" 162" 164" 166" 168" 170" 172" 174" 176" 178" 180" 182" 184" 186" 188" 190" 192" 194" 196" 198" 200" 202" 204" 206" 208" 210" 212" 214" 216" 218" 220" 222" 224" 226" 228" 230" 232" 234" 236" 238" 240" 242" 244" 246" 248" 250" 252" 254" 256" 258" 260" 262" 264" 266" 268" 270" 272" 274" 276" 278" 280" 282" 284" 286" 288" 290" 292" 294" 296" 298" 300" 302" 304" 306" 308" 310" 312" 314" 316" 318" 320" 322" 324" 326" 328" 330" 332" 334" 336" 338" 340" 342" 344" 346" 348" 350" 352" 354" 356" 358" 360" 362" 364" 366" 368" 370" 372" 374" 376" 378" 380" 382" 384" 386" 388" 390" 392" 394" 396" 398" 400" 402" 404" 406" 408" 410" 412" 414" 416" 418" 420" 422" 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IMMEDIATE DELIVERY

DRILLING MACHINES

Leland H.S. B.B., bench type.
No. 1½ Knight Driller and Miller.
14" Rockford Sensitive.
20" Kern, b.g.
22" W. F. & J. Barnes, s.h., b.g., p.f.
No. 25 Foote-Burt 24" drill (new).
32" W. F. & J. Barnes, s.h., b.g., p.f.
32" Hamilton, s.h., b.g., p.f.
No. 30-C Baush, 12 spindle.
20" W. F. & J. Barnes, 4 spindle.
3" W. E. Gang Plain Radial.
3½" W. E. Gang Plain Radial.
Pawling & Harnischfeger Horizontal Driller.
No. 1B Bement Horizontal Driller and Borer.
48" Colburn Mill, 2 swivel heads.

GEAR CUTTERS

Reynolds Hobber.
No. 11 B. & S. automatic.
30" x 9" G. & E. auto. for spur and bevel.
24" x 7" G. & E. for spur.
No. 3 26" B. & S. for spur.
36" Walcott for spur.

GRINDERS

Yankee Drill.
Leland Universal, with power feed.
No. 23 B. & S. Gear Cutter.
8" x 30" Modern Plain (new).
14" x 20" B. & S. Plain.
Garvin hole grinder.
Gisholt tool grinder.
No. 5 Diamond water tool.
No. 16 Gardner disc grinder.
No. 24 Gardner disc grinder.

LATHES

13" x 5' P. & W., c.r., taper.
14" x 6' Fairbanks, c.r. taper.
16" x 6' Prentice, c.r.
18" x 8' L. & S. pat. head, c.r. taper.
18" x 10' Fitchburg, c.r.
18" x 12' Barker, c.r.
20" x 14' Blaisdall, c.r.
21" x 12' New Haven, c.r.
24" x 13' New Haven, c.r.
32" x 16' Blaisdall, c.r.
36" x 20' American, t.b.g.
36" x 22' New Haven, t.b.g.
3½" x 60" Fitchburg Lo-Swing.

PLANERS

36" x 36" x 16' Sellers, one head.
36" x 36" x 12' Cleveland, open side, 3 heads and arranged for motor drive.
36" x 36" x 12' Detrich & Harvey, open side, 2 heads, one side head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.
40" x 48" x 18' New Haven Planer, 2 heads, 2 extension heads.

SCREW MACHINES

1" B. & S. Plain.
16" P. & W. Plain.
No. 2 Foster, plain head.
No. 2 Costello, plain head.
No. 2 P. & W. friction head.
No. 3 Foster, geared head.

No. 4 Pearson, geared head.
No. 3 Bardons & Oliver, plain head.
No. 12½ Garvin, friction head.
¾" Cleveland, automatic.

TURRET LATHES

16" Lodge & Shipley.
25" Niles.
2 x 24" Jones & Lamson.
3 x 36" Jones & Lamson, chucking equipment.
3 x 36" Jones & Lamson, bar equipment.
21" Gisholt, with taper.
2-24" Gisholt turret lathes, taper attachment.

PUNCHES AND SHEARS

No. 2 L. & A. Angle Iron Shears, 5"x5"x½" (new).
No. 5 L. & A. Double Punch & Shear, ⅝"x⅝", 3"x¾", 1½" rd. (new).
No. 1 L. & A. Multiple Punch (new).
No. 2 L. & A. Multiple Punch (new).
No. 1 L. & A. Horizontal Punch, ½" in 1" (new).

MISCELLANEOUS

No. 2 Kempsmith Universal Miller.
50-lb. Bradley Strap Hammer.
100-lb. Bradley Helve Hammer.
¾" Acme Forging Machine.
52" Niles car wheel boring mill.
3" Stover Pipe Machine.
6" x 14" P. & W. Thread Miller.
No. 1 American Air Tempering Furnace.
Belt Lacing Machine.
3-ton Yale Duplex Hoist.

Stocker-Rumely-Wachs Company, 117-121 N. Jefferson St., CHICAGO, ILL.

Polson Iron Works

Limited

TORONTO

Surplus Machinery for Sale

2-3" Hall Cut-Off Machines
1-Lodge & Shipley Turret Lathe, 22" x 10'
1-Lodge & Shipley Turret Lathe, 24" x 10'
2-Libby Turret Lathes, 18"
1-Gisholt Turret Lathe, 18"
2-Gisholt Turret Lathes, 21"
1-Gardner Shell Base Grinder, 4A
1-Ford-Smith Grinder, 20"
2-Landis Traverse Grinders, 4'
1-Symington Band Turn Lathe, 3"
1-Goldie McCullough Band Press and Pump, 3"
1-3" Stamping Machine
2-Tate-Jones Shell Furnaces
3-Blowers

MACHINE TOOLS IN STOCK

No. 4 Cincinnati Universal Miller with Vertical Attachment and Power Feed Rotary Table.
No. 3 LeBlond Universal Miller.
No. 3 Kempsmith Plain Miller with Index Heads and Vertical Attachment.
4 No. 1½ NEW American Plain Millers.
5-No. 0 NEW Steptoe Hand Millers.
24" x 10' NEW Carroll-Jamieson Heavy Duty Lathe.
6-19" x 8' NEW Sidney, D.B.G., quick change, swing 21" over V's.
3 17" x 8' NEW Sidney, D.B.G., quick change, swing 19" over V's.
1 15" x 6' NEW Sidney, D.B.G., quick change, swing 17" over V's.
12-17" x 8' NEW National, quick change.
1 15" x 6' NEW Carroll-Jamieson, quick change.
48" Harrington Plain Radial Drill.
36" Drees Plain Radial Drill.
D-4 Colburn High Duty Drills.
3-20" Rockford High Duty Drills.
1-28" NEW Superior Sliding Head Drill.
2-25" NEW Superior Drills, with tapping attachment.
16" Queen City B.G. Shaper.
20" Cincinnati B.G. Shaper.
24" NEW Steptoe B.G. Shaper.
24" Flather B.G. Shaper.

FRANK TOOMEY, INC.

127-131 North Third St., PHILADELPHIA, PA., U.S.A.

If any advertisement interests you, tear it out now and place with letters to be answered.

FOR SALE

Equipment used for making 18-pr. Shells.

- 1-Warner & Swasey Turret Lathe, 2" x 24", with attachments.
- 1-Linderman Double Spindle Boring Machine, with attachments for finish boring shrapnel and nose turning H.E.
- 1-Flather & Co. 14" x 6' 0" Lathe, with chuck and countershaft.
- 1-Fosdick 16" x 6' 0" Lathe, with collet chuck and taper attachment.
- 1-Braopose 16" x 6' 0" Lathe, collet chuck and taper attachment.
- 1-Goldie & McCulloch Nosing Press with Dies.
- 1-Beatty Accumulator.
- 1-Lees-Bradner Thread Miller, with attachments and countershaft.
- 1-Jones & Lamson Turret Lathe, 2" x 24".
- 1-40-gallon Bowser Tank and Pump; good as new.
- 1-Cold Saw, with variable speed motor, 60 cycle, 220 volt, cuts up to 8" stock, complete with three saws.
- 1-4-Connection Pyrometer with Rheostat, made by Taylor Instrument Co.
- 1-Thermo Couples, 39" long, bent 12 1/2" from nose.
- 1-Thermo Couples, 39" long, straight.
- 1-One-Connection Tyco's Pyrometer, made by Taylor Co.
- 1-Bertram Band Turning Attachment, for 24" Lathe, Ball-bearing Centre.

All the above located at Welland. Prices, Delivery and full particulars gladly furnished.

M. Beatty & Sons, Limited
Welland, Ont.

FOR SALE

- 4-14 x 6 Flather Engine Lathes, C.R., Q.C.G., new.
- 4-14 x 5 Reed Engine Lathes, R. & F.
- 3-18 x 8 Davis Engine Lathes, D.B.G.
- 1-18 x 10 Rahn-Larmon Engine Lathe, new.
- 1-18 x 12 Rahn-Larmon Engine Lathe, new.
- 1-22" x 10' Nicholson & Waterman Engine Lathe.
- 1-No. 13 B. & S. Automatic Gear Cutter.
- 1-30" Newark Automatic Gear Cutter.
- 1-5 x 48 Pratt & Whitney Plain Grinder.
- 1-No. 2 Bath Universal Grinder.
- 1-12 x 60 Modern Plain Grinder, new.
- 2-Lees-Bradner Thread Millers.
- 1-30 x 30 x 8' Powell Planer, new.

Brownell Machinery Co.
Providence, R. I.

Single Purpose and Shell Lathes

- 22-18" x 8' Battle Creek Lathes, single back gear, 2-step cone with counter shaft.
- 6-18" x 9' Chard Lathes, 3-step cone, double back gear, compound rests, semi-quick change with face plates, steady rests and counter shafts.
- 3-20" x 8' Mershon Lathes, 3-step cone, double back gear, compound rest and counter shafts.
- 4-20" x 8' Oakley Lathes, 3-step cone, double back gear, compound rests with oil pumps and pan and counter shafts.
- 1-20" x 10' Oakley Lathe, 3-step cone, double back gear, compound rests with oil pumps and pan and counter shafts.
- 4-20" x 8' Bullard Projectile Turret Lathes.

If you can use all or a part, we will be pleased to have you communicate with us promptly.

EAST DAYTON MACHINERY COMPANY
Dayton, Ohio

csm

A MAN

was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

"Williams" List of Machine Tools

FOR IMMEDIATE SHIPMENT

New Lathes

- 3-16 x 8 "CISCO"
- 4-18 x 10 "CISCO"
- 2-17 x 8 Le BLOND
- 6-19 x 10 Le BLOND
- 6-21 x 8 Le BLOND
- 1-25 x 10 Le BLOND
- 6-24 x 12 C.M.C.
- 1-36 x 26 PITTSBURG (triple geared)

Used

- 3-16 x 6 CINCINNATI Q.C.G.
- 5-20 x 10 HUNDMAN
- 2-20 x 10 LODGE & SHIPLEY (geared head)
- 8-22 x 10 PUTNAM
- 1-24 x 16 BERTRAM
- 1-27 x 16 REED-PRENTICE
- 6-24" DAVIS Boring Turret Lathes
- 7-18" LIBBY Turret Lathes
- No. 2 WARNER & SWASEY Turret
- 2 x 24 JONES & LAMSON Turrets

Automatics

- 2-2 x REED PRENTICE
- 3-2 x REED PRENTICE
- 10-23" CLEVELAND
- 18-6A POTTER & JOHNSON

Drills

- New 25" BARNES
- 6-26" BARNES
- 3-25" SUPERIOR
- 1-22 1/2" BARNES
- 1-24" AURORA
- 1-26" AURORA
- 2-D 1. COLBURN
- 3-D 5. COLBURN
- 1-New BUFFALO Heavy Duty

New Radials

- 1-4' MUELLER
- 3-5' REED-PRENTICE (speed box drive)

New Shapers

- 2-14" SMITH & MILLS
- 4-10" SMITH & MILLS
- 2-20" SMITH & MILLS
- 4-20" GOULD & EBERHARDT
- 4-24" GOULD & EBERHARDT
- 1-28" GOULD & EBERHARDT

Millers

- New 3 H. Le BLOND UNIVERSAL
- New No. 25 BECKER PLAIN
- No. 2 CINCINNATI UNIVERSAL
- No. 2 KEARNEY & TRECKER

Planers

- 36 x 36 x 11 INDUSTRIAL
- 36 x 36 x 12 C.M.C.
- 52 x 52 x 16 McKECKNIE BERTRAM (two heads)

Slotters

- 8 1/2" BERTRAM
- 10" BERTRAM
- 16" SMITH, PEACOCK & TANNET

Miscellaneous

- 3000 lb. MORGAN Steam Hammer
- BERTRAM Horizontal Boring Machine
- 32" LONDON Vertical Boring Mill
- NEWTON Vertical Miller

This is only a partial list.
Write stating your needs.

A Salesman Always on the Job

IT is the constant dropping that wears the stone away. It is the constant knocking at the door of attention and favor that in the end gives you ready access to the good-will of buyers of your merchandise.

You can keep up a constant knocking—a bid for attention, a reminder of yourself, a spokesman of your message—this by using regularly

The FARMER'S MAGAZINE

No man whose customers and should-be customers are farmers should be absent from their attention. Their will and purpose to buy may mature at any time. The salesman on the spot stands the best chance to get the order.

All this you know, but—do you live up to the behest of your knowledge?

Let us tell you more about The Farmer's Magazine in a special letter.

N.B.—Objectionable advertising not accepted. Both editorial and advertising columns are closely censored to keep them clean and decent.

Published by

The MacLean Publishing Co., Limited
143-153 University Avenue, Toronto, Ontario

A. R. WILLIAMS MACHINERY CO., LIMITED
64 Front Street West Toronto, Ontario

LOOK—HERE THEY ARE

BORING AND TURNING MACHINES—

VERTICAL.

- 1-20" Bullard, 1 turret head.
- 1-30" Flatbar, 1 turret head.
- 1-New 30" Gisholt, September delivery.
- 1-New 30" Rogers, one turret head, Sept. delivery.
- 1-New 40-42" Colburn, single turret head, August delivery.
- 2-30" B. & S., one turret head; Dec. delivery.
- 1-30" Niles, one swivel, one turret head.
- 1-40" H.P., two swivel heads, motor drive.
- 1-30" Niles, two swivel heads.
- 1-30" Niles, two swivel heads, slotting attachment.
- 1-30" Sellers, one head.
- 1-New 8" Bickford, December delivery.

BORING MACHINES—HORIZONTAL.

- 1-No. 1 Barrett Cylinder Borer, 3/4" bar type.
- 1-No. 2 3/4" Bar, two side facing heads.
- 1-Conradson Motor-driven Driller, Borer and Taper, 5" adjustment of head on column, 2" spindle travel.
- 1-Lane & Bodley, capacity 8" x 15" floor, plate 19", 8" boring bar, motor-driven.
- 1-Hoefer Horizontal Driller and Borer, with 1 1/2" spindle, vertical adjustment 40", horizontal adjustment 46", size of table 33" x 48".
- 1-Lucas, 2 1/2" bar.
- 1-Newburgh 4" bar, 84" swing, 72" feed.

PULDOZERS.

- 1-No. 8 Ajax, 20 H.P. motor drive.
- 1-New No. 4 Garrison (same as No. 4 Williams-White).
- 1-No. 7 Ajax, 20" stroke.
- 1-No. 7 High-Speed Air, 16" stroke.

COMPRESSORS—AIR.

- 1-8" x 6" Curtis, belt-driven.
- 1-Ingersoll Sargent Duplex, 8 x 1 1/2 x 8".
- 1-Cincinnati Triple Compound 1 two-stage, 730 cu. ft.
- 1-Ingersoll Sargent Steam Driven, 345 cu. ft.
- 1-10" x 12" Chicago Pneumatic, belt-driven.
- 1-New 10" x 10" Single Cylinder Smith-Valle, steam driven.
- 1-10" x 10 1/2" x 13" Peerless, cross compound, steam driven.
- 1-22" x 15" x 16" Ingersoll Rand, motor driven.

CRANES.

- 2-ton Alfred Box Electric Traveling Crane, 40' span.
- 2-ton Browning Electric Traveling Crane, 40' span.
- 1-Locomotive, 35' boom, standard gaged, steam driven.

CUTTING-OFF MACHINES.

- 2-No. 60 Brown & Sharpe.
- 1-capacity Warner & Swasey.
- 1-24" Hall.
- 1-24" Williams.
- 1-4" Curtis & Curtis.
- 30-Davis, 45" capacity.

DRILLING MACHINES—RADIAL.

- 2-New 2" American, cone drive.
- 1-3" Bickford, semi-universal table.
- 1-Bickford, gear drive.
- 4-New 3" Planitrol, belt delivery.
- 1-New 3" Mueller, plain speed, box drive.
- 1-New 3 1/2" American, tapping attachment, Sept. delivery.
- 1-New 3 1/2" Western Drill, 86" circle.
- 2-New 4" American, tapping attach.; Sept. del.
- 1-3" Mueller, plain, speed box drive.
- 1-5" semi-universal American.
- 5-New 5" Baugh Plain.
- 1-2 1/2" American full universal.
- 1-5" Baugh Plain, cone drive.
- 10-New 6" Triumph, motor drive; Sept. del.

DRILLING MACHINES—HEAVY DUTY.

- 2-New 2" Colburn, 24" swing, capacity 2" in solid steel.
- 1-D.3 Colburn, plain table.
- 1-No. 20 Baker, one pulley drive, late type.

DRILLING MACHINES—MULTIPLE SPINDLE.

- 4-New Leland-Gifford, sensitive, four spindle.
- 1-No. 24 Baugh, 12 spindles.
- 1-No. 30C Baugh, 12 spindle, capacity 1 1/2" holes, 30" circle.
- 1-No. 11 Pratt & Whitney, 16 spindle, capacity 10 spindles, 2 1/2" cap.
- 1-14-spindle Baugh, capacity 1" holes, 36" circle.

GEAR-CUTTING MACHINES.

- 1-No. 1 Whitton.
- 1-No. 3 Bickett Gear Rack Planer, delivery 60 days.
- 1-No. 3 Brown & Sharpe Auto. Gear Cutter, Spur.
- 1-New 6" Standard Gear Cutter, Spur.
- 1-12" Gleason Bevel Gear Planer.
- 1-16" Gleason Bevel Gear Planer.
- 1-18" Bilgram Bevel Gear Generator.
- 1-20" Grant-Lee Gear Hobber.
- 1-No. 1 20" Schuchmacher & Schutte Gear Hobber.
- 1-24" G. & E. Spur and Bevel Cutter.
- 1-24" Fellows Gear Shaper.
- 1-24" x 8" G. & E. for Spur and Bevel.
- 1-30" Becker Planitrol.
- 1-New No. 10 Whitton, Bevel 20", Spur 34".
- 1-36" Fellows Gear Shapers.

GRINDERS—UNIVERSAL, FOR CUTTERS.

- 1-LeBlond Universal, one year old.
- 1-No. 1 Cincinnati.

DRILLS, REAMERS, ETC.

- 1-LeBlond Universal, one year old.
- 1-No. 1 Cincinnati.

1-New Norton No. 1.

- 1-New Walker No. 2, outfit; K capacity 9" x 2 1/2".
- 1-New Walker No. 1, outfit B.
- 1-New Wilmarth & Morman, style B.K.
- 1-New No. 100 Wells.
- 1-Gisholt No. 5, 12".

GRINDING MACHINES—CYLINDRICAL.

- 1-5" x 48" Pratt & Whitney.
- 1-New No. 12 Brown & Sharpe, 8" x 30", Sept. delivery.
- 1-New 10" x 36" Landis; immediate.
- 1-New 10" x 30" Norton, Sept. delivery.
- 1-New 10" x 30" Norton, Sept. delivery.
- 1-New 10" x 12" Norton, Plain.
- 2-12" x 24" Modern, self-contained.
- 1-12" x 32" Landis, rebuilt.
- 6-12" x 36" Modern, self-contained, motor or belt driven.
- 2-12" x 42" Landis, self-contained.
- 6-12" x 48" Modern, self-contained, motor driven.
- 1-16" x 66" Landis, with crank grinding.
- 1-18" x 96" Brown & Sharpe.

GRINDING MACHINES—CYLINDRICAL—UNIVERSAL.

- 1-Brown & Sharpe No. 13, 8" x 24".
- 1-New No. 2 (9" x 20") Bath.
- 2-New Walker, 9" x 20".
- 1-No. 14 (10" x 30") Landis.
- 1-New No. 2 1/2 (10" x 36") Bath.
- 4-42" Modern.
- 9-New No. 2 Morse, cap. 12" x 30", Universal, Nov. delivery.
- 1-No. 3 (12" x 40") Brown & Sharpe.
- 1-12" x 42" Landis.
- 2-New No. 3 Modern, 13" x 4", Sept. delivery.

GRINDERS—INTERNAL.

- 1-No. 14 Landis.
- 1-No. 70 Head.
- 1-No. 75 Head.

GRINDERS—CYLINDER.

- 1-No. 27 Brown & Sharpe.
- 1-No. 60 Head, single pulley drive.

GRINDERS—PROFILE.

- 1-New Cleveland.

GRINDERS—DISC.

- 1-New No. 17 Gardner (Pattern Makers).

GRINDING MACHINES—RING.

- 1-New No. 14 Beasley, two-ring chuck.
- 1-No. 20 Head.
- 1-No. 20 Head.

GRINDING MACHINES—EDGE.

- 1-No. 374 Safety Emery Wheel Co.

GRINDING MACHINES—SURFACE.

- 1-New No. 1 Wilmarth & Morman.
- 1-No. 1 Diamond, capacity 12" x 12" x 24", auto-mat.

GRINDING MACHINES—DUPEX.

- 1-No. 5 Bath, suitable for grinding cylinders, piston rings, etc., 16" feed, swivel table, water pump.

GRINDING MACHINES—FACE.

- 1-Diamond Face Grinder, 4" travel, 14" wheels.

HAMMERS—BOARD LIFT—DROP.

- 1-40-lb. Bradley Helve.
- 1-150-lb. Bradley Helve, upright.

HAMMERS—STEAM—FORGING.

- 1-Use 100-lb. Single Frame.
- 1-25" Morgan & Williams, 60 to 80 lbs., 21" cap.
- 1-New 100-lb. Bell Standard Guide, Single Frame.
- 1-300-lb. Bell; Sept. delivery.

HAMMERS—ENGINE.

- 2-No. 0 Mitts & Merrill.
- 1-No. 2 Mitts & Merrill.
- 1-60" stroke Compton Knowles Broacher.

LATHES—MANUFACTURING—NOT SCREW CUTTING.

- 2-New 3" Harding Brothers Bench Lathe.
- 14-Benjamin Shell Lathes, for 4" or 18 lbs. American shells.
- 70-New Simplex, 16" x 8".
- 13-New 3X Bedford, semi-automatic.
- 40-14" x 8" Bevel Stud and Bolt.
- 5-16" x 8" Fairbanks-Morse, heavy duty.
- 15-14" x 8" Simplex, Single Pulley Drive.
- 1-14" x 8" Bedford, taper attachment.
- 5-20" x 8" Merschon.
- 50-20" x 10" Hindman, high duty.

LATHES—ENGINE.

- 6-New 12 x 4 Shepard, reverse head.
- 8-New 12 x 5 Shepard, reverse head.
- 3-New 12 x 6 Shepard, reverse head.
- 1-14" x 6" Bradford, taper attachment.
- 1-New Harding Brothers 15" Precision Lathe, quick-change geared, page 35, third catalogue.
- 3-New 16" x 4" Cleveland Tool Room Lathes, complete equipment.
- 2-16" x 6" LeBlond, pan lat, quick-change gears, taper attachment.
- 1-18" x 8" Lodge & Shipley, geared head, taper.
- 3-18" x 9" Chard.
- 1-18" x 10" Hendey, quick-change gear, 14" chuck.

- 1-New 19" x 8" LeBlond, heavy duty.
- 2-20" x 8" Lodge & Shipley, quick-change gear.
- 7-New 20" x 8" American, heavy duty.
- 25-New 21" x 10" Porter, single back geared.
- 5-New 22" x 10" Monarch, double back geared, U.G.G.

9-22" x 10" Putnam; oil pan turrets.

- 3-24" x 10" Bevel.
- 1-24" x 12" Bickett, B.
- 4-24" x 14" American, quick-change.
- 1-24" x 14" Lodge & Shipley, patent head.
- 1-24" x 16" Perkins, single back geared, raising blocks to 40", 18" chuck.
- 1-24" x 42" x 22" McAlister, double spindle.
- 1-24" x 20" New Haven.
- 4-27" x 14" Patent Head Lodge & Shipley, double back geared.
- 1-28" x 13" New Haven, single back geared.
- 1-28" x 15" Schuchmacher & Boye.
- 3-New 32" x 12" Trubshaw pattern.
- 8-New 36" x 24" Putnam, triple geared.
- 1-38" x 18" American, raising blocks to 63".
- 1-38" x 19" Steptoe, single back geared.
- 1-48" x 27-9" Betts, triple back geared.
- 1-60" x 27" Betts, triple back gear.
- 1-60" x 30" Putnam; Dec. delivery.
- 1-71" x 20" Fifield, triple gear.

LATHES—TURRET.

- 5-2 x 24 Jones & Lamson.
- 5-3 x 36 Jones & Lamson.
- 18-64 Potter & Johnson.
- 1-New 24" Gisholt.

MILLING MACHINES—KNEE TYPE—UNIVERSAL.

- 1-No. 2 Kemsmith, 15", dividing head.
- 1-New Kemsmith, vertical attachment.
- 1-No. 1 1/2 Hendey-Norton.
- 1-No. 2 Kemsmith, back geared.
- 1-No. 2 New Cincinnati.
- 1-New No. 2 1/2 LeBlond, Sept. delivery.
- 1-New No. 3 Kemsmith.
- 1-New No. 3 Becker, August delivery.
- 1-New No. 4 LeBlond, heavy duty; immediate.
- 1-No. 4 Cincinnati, with vertical attachment.

MILLING MACHINES—KNEE TYPE—PLAIN.

- 1-No. 0 Pratt & Whitney.
- 1-New No. 1 Brown & Sharpe.
- 1-New No. 1 Kemsmith.
- 1-New No. 1 1/2 American, rack gear.
- 1-New No. 2 Rockford.
- 1-New No. 2 1/2 LeBlond, August delivery.
- 1-New No. 3 Cincinnati.
- 1-No. 4 Garvin.

MILLING MACHINES—VERTICAL.

- 1-New Bickett, No. 6.
- 4-New No. 4B Becker.
- 2-New 5 Becker.
- 1-New Brown & Sharpe.

MILLING MACHINES—PLANNER TYPE.

- 1-No. 2 Beaman & Smith.
- 1-No. 4 Beaman & Smith, vertical spindle, open side, working surface of table 120" x 24", removable housing on one side.

PLANERS.

- 1-24" x 24" x 6' Gray, one head on cross rail.
- 24" x 24" x 8" Cincinnati, one head; used three months.
- 1-25" x 20" x 8' Gray, one head on cross rail.
- 1-30" x 30" x 8" Gale Plant, one head.
- 1-30" x 30" x 12" Cincinnati, two heads.
- 1-36" x 30" x 12" New Haven, one head.
- 3-New 36" x 36" x 12" Bickett, one head, Nov. delivery, additional heads if desired.
- 2-New 36" x 36" x 12" Woodward & Powell, two heads on cross rail, one side head; Oct. delivery.
- 1-36" x 36" x 12" Gray, two heads.
- 1-36" x 36" x 14" Sellers, four heads.
- 1-40" x 30" x 11" Niles, four heads.
- 1-Gray, widened to 56" x 42" x 15, two heads.
- 1-48" Cleveland Rotary Planer.
- 3-New 48" x 42" x 15" Bickett, one head, Nov. delivery; additional heads if desired.
- 1-48" x 48" x 15" Sellers, one rail head, two side heads.
- 1-50" x 14" Powell, one head.
- 1-52" x 32" x 15" Betts, two heads, right angle drive.
- 1-52" 6 Niles Plate Planer.

SURFACE MACHINES—AUTOMATIC.

- 1-No. 51 National Acme.
- 1-No. 515 National Acme.
- 2-No. 52 National Acme.
- 2-No. 53 National Acme.

SHAPERS.

- 1-New 16" Springfield.
- 1-16" Motor-driven Rockford.
- 1-New 20" Milwaukee.
- 1-New Barker, 24".
- 3-New 24" Steptoe, back gear.
- 1-30" Wilcott, gear drive.
- 1-Spindle 30" Norton, with 7" Universal Radial drill on base plate.

SLOTTERS.

- 1-New 10" Newton.
- 1-18" Betts, adjustable stroke.
- 1-120" Vertical Slotter, 16" stroke, two heads.

W. F. DAVIS MACHINE TOOL COMPANY

CHICAGO, ILL. CINCINNATI, OHIO CLEVELAND, OHIO NEW YORK CITY
549 Washington Bldg. 1018 Union Central Life Bldg. 508 Leader News Bldg. Singer Bldg.

WRITE OR WIRE OUR NEAREST OFFICE FOR QUOTATIONS
THIS IS ONLY A PARTIAL LIST OF AVAILABLE MACHINES

If any advertisement interests you, tear it out now and place with letters to be answered.

STEEL BUILDING CRANES

Can be seen in operation

Steel Building or Coal Shed, 108 ft. x 298 ft., maximum height 40 ft., containing approximately 450 tons of structural steel.

Two Brown Patent Bridge Tramways, hoisting and conveying apparatuses, consisting of a bridge tramway with tracks permitting a movement of 300 ft.; distance between movable piers 180 ft., with end cantilevers 92 ft. and 36 ft. Each bridge has in its house, Brown Patent Hoisting Engine with the most modern operating mechanism, together with all necessary fittings and connections for complete operation, together with six Brown Patent Automatic Self-dumping Coal Tubs of 42 cu. ft. capacity; two single rope buckets of 48 cu. ft. capacity; four skips of 2 ton capacity; and also automatic clam shell bucket. Both these outfits are practically in new condition.

**New York Machinery
Exchange, Inc.**

50 Church Street . . . New York City

We Have for Immediate Delivery the Following Second-hand Machinery in Good Oper- ative Condition

- 1 Landis No. 3 Universal Grinder 12" x 42", complete equipment, less internal grinding attachment. \$1,500
- 1 Gisholt Turret Lathe, 21", complete with boring bar equipment and countershaft\$2,200
- 1 Gisholt Turret Lathe, 21", complete with boring bar equipment and countershaft\$1,800

These machines are particularly good value, and may be seen at our works.

A. B. JARDINE & COMPANY
HESPELER, ONT.

Rebuilt Machines For Sale

PLANERS

- 1-24x24x6 Powell.
- 5-Sellers 25x25x6.
- 2-Sellers 25x25x8.
- 1-Putnam 24x36x8' 6".
- 1-Wheeler Heavy 30x36x8' 6".
- 1-Lathe-Morse 24x24x6' 6".
- 1-New Haven 24x24x7'.
- 1-Putnam 42x40x12' 6".

GRINDERS

- 1-LeBlond Universal Tool and Cutter, power feed, same as new.
- 1-Bridgeport Plain Grinder, 16x36.
- 1-No. 3 Landis Universal Grinder.
- 2-No. 6X Diamond Double Disc Grinders.
- 1-Ford Smith Plain Grinder.

AUTOMATICS

- 1-1" National Acme Double Belt Type.
- 1-1½" National Acme Double Belt Type.
- 1-No. 55 National Acme.
- 1-1" National Acme, four spindle.
- 2-No. 64 National Acme, four spindle.
- 3-2" Cleveland.
- 1-2½" Cleveland.
- 2-2½" Gridley Single Spindle Motors.
- 1-3¼" Gridley Single Spindle Motor.

LATHES

- 1-32x12" Draper Lathe, C.R., H.S.
- 1-30x8" Fitchburg, C.R., P.C.F.

- 3-16x6" Putnam, C.R., taper.
- 6-18x8" Porter, C.R., semi-quick, taper.
- 2-18x8" Davis, C.R., pan, pump, taper.
- 10-16x8" Greaves-Klusman, C.R., pan, pump.
- 9-20x6" Perkins Plain Turning, pan, pump.
- 1-34x6" Porter, C.R.
- 1-30x8" LeBlond, C.R.
- 1-13x5" Seneca Falls, C.R., pan.
- 14-20x6" Perkins Lathes, pan bed, chuck, Fay & Scott Turrets.

MISCELLANEOUS

- 1-No. 5 Becker Vertical Miller.
- 2-No. 310 Baker Drills.
- 1-No. 18 Bliss Press.
- 1-No. 1 Whiton Gear Cutter.
- 1-No. 4 Garvin Plain Miller.
- 1-No. 3 Kempsmith Plain Miller, same as new.
- 1-9" Industrial Works Slotter.
- 1-3½" Aurora Sliding Head Back Geared Drill.
- 3-Prentice 24" Sliding Head Drills.
- 2-Industrial 60" Drills.
- 1-Western Hydraulic Banding Machine.
- 1-Jencks Band Turning Lathe, with 3" Universal Chuck.
- 1-36" Aurora Drill.
- 1-12" Bement Travelling Head Shaper.
- 1-Sellers Slab Miller, 24x24x12'.
- 1-No. 21 Lee-Simplex Saw.
- 1-26x10 Cincinnati Gear Cutter.

This is only partial list—Send for full list

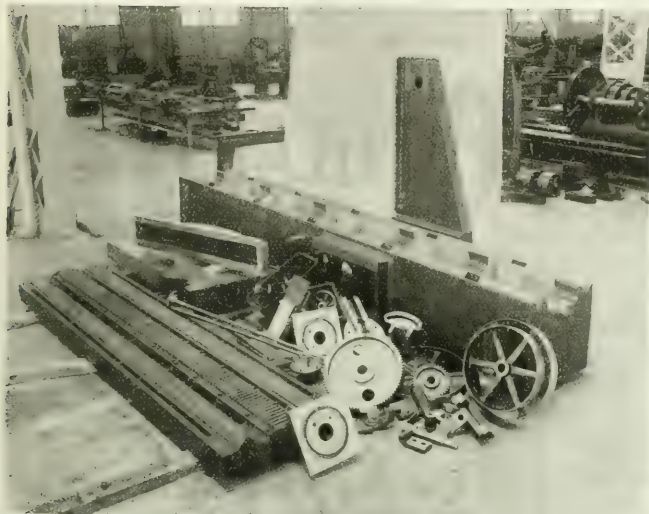
Simmons Machine Company, Inc.

NEW YORK, 1001 Singer Bldg., Telephone COrtlandt 6575
ALBANY, N. Y., 985 Broadway, Telephone MAin 4876

ReMANUFACTURED

—(ORIGINATED BY US)—

MACHINE TOOLS



Showing a 36" Planer ready for assembly. All flat surfaces have been hand scraped to B. & S. surface plates and straight edges. After assembling the machines will be tested under belt for operation and accuracy.

Very Latest Models—None Over 2 Years Old

ENGINE LATHES

- 24—22" x 8' Hamilton, D.B.G., C.R., Semi-Q.C.
- 5—22" x 8' Hamilton, D.B.G., Turret tool post.
- 4—22" x 8' Davenport, D.B.G., Turret tool post.
- 7—22" x 10' Hamilton, D.B.G., C.R., Semi-Q.C.G.
- 2—22" x 10' Hamilton, D.B.G., Turret tool post, Semi-Q.C.G.
- 20—22" x 10' Davis, D.B.G., C.R., Q.C.G.
- 8—24" x 10' Lodge & Shipley, D.B.G., C.R., Q.C.G.
- 11—26" x 10' American, D.B.G., C.R., and Carriage Turret, Q.C.G.
- 2—26" x 10' American, D.B.G., Carriage Turret.
- 19—26" x 12' Putnam, Carriage Turret, Semi-Q.C.
- 9—26" x 12' Putnam, C.R., Semi-Q.C.
- 2—26" x 12' Wickes, D.B.G., C.R., Semi-Q.C.G.
- 10—28" x 10' Niles, Bement, Pond, D.B.G., Q.C.G.
- 4—28" x 14' Lodge & Shipley, Selective Gd. Hd., Motor Drive, C.R., Turret and Taper.
- 3—30" x 16' Lodge & Shipley, D.B.G., C.R., Turret and Taper.
- 10—40" x 18' Pittsburgh, Triple Geared, Q.C.G.

TURRET MACHINES

- 25—21" Gisholts, $3\frac{1}{2}$ " hole, 2-step, 5" belt.
- 25—21" Gisholts, $3\frac{1}{2}$ " hole, motor arrangement.
- 13—24" Gisholts, $4\frac{1}{2}$ " hole, 3-step, 4" belt.
- 38—24" Gisholts, 6" hole, 2-step, 6" belt.
- 41—24" Gisholts, 6" hole, motor arrangement.
- 2— $2\frac{1}{4}$ " x 26" Greenlee Flat Turrets.
- 2— $2\frac{1}{2}$ " x 26" Pratt & Whitney Gd. Hd. Turrets.
- 4—3-A Warner & Swasey (bar machines).

RADIAL DRILLS

- 4—21 $\frac{1}{2}$ " Fosdick.
- 2—21 $\frac{1}{2}$ " Mueller.
- 1—21 $\frac{1}{2}$ " Dresses.
- 1—3" Prentice.
- 1—3" Mueller.
- 1— $3\frac{1}{2}$ " Gang.
- 1—1 Niles Full Universal.
- 3—5" Niles Semi-Universal.

MILLING MACHINES

- 2 No. 5 Brainard.
- 1 No. 3 Brainard Plain.
- 1 No. 20 Oesterli Universal.
- 1 No. 11 $\frac{1}{2}$ Brown & Sharpe Universal.
- 1 No. 25 Becker Plain.
- 1—No. 2 Cincinnati Universal.
- 1—No. 5 Schuchardt & Schutte Plain.
- 1 No. 3 Hendey Plain.
- 4 No. 2 Pratt & Whitney Lincoln.
- 1—60" x 48" x 8' Ingersoll Slab.
- 1 Beaman & Smith, 2 vert. hds., 1 hor. cross bor. hd.
- 1—No. 2 Beaman & Smith Combination horizontal and vertical.

SHAPERS

- 1—15" Hendey Friction Shaper.
- 1—16" Perkins Friction Shaper.
- 2—16" Barker Plain Crank.
- 1—24" Gould & Eberhardt Back Geared Crank.
- 1—24" Queen City Back Geared Crank.
- 1—48" Morton Draw Cut.

PLANERS

- 1—22" x 22" x 5' Flather.
- 1—22" x 22" x 6' American.
- 1—24" x 24" x 4' Gray.
- 2—24" x 24" x 5' Gray.
- 1—24" x 24" x 6' Cincinnati.
- 1—24" x 24" x 10' Lodge & Davis.
- 1—26" x 26" x 6' American.
- 1—30" x 30" x 7' Powell, 4 heads.
- 1—32" x 32" x 8' Gray, 2 heads.
- 1—32" x 32" x 10' Gray, 2 heads.
- 1—48" x 48" x 16" Pond, 2 heads.
- 1—76" x 48" x 18" Woodward & Powell, 3 heads.

PRESSES

- 1—No. 30 Perkins Inclinable.
- 1—No. 5 Niagara Inclinable.
- 1—No. 3 Consolidated Inclinable.
- 1—No. 20 U. Ryerson Punch.
- 1 Trimming Press.
- 3 No. 731, Niagara Trimming Presses.
- 1—No. 23 $\frac{1}{2}$ -B Niagara Toggle Press.
- 1—Long & Alstater Geared Punch.
- 1—No. 17 Williams and White Double End Punch.

**SEND FOR GREEN LIST
AND PICTURE BOOK.**

HILL, CLARKE & CO. OF CHICAGO

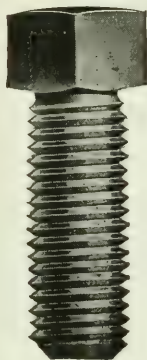
625 WASHINGTON BLVD., CHICAGO, ILL.

SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

ACCURACY



Send us your rush orders for Screws and Nuts. We ship from a stock where "Accuracy" is all important.

Prompt service and "GALT" quality goods only.

Specialists in Gap and Set Screws.

**THE
GALT MACHINE SCREW CO.,
LIMITED**

GALT, ONTARIO

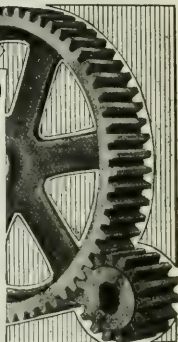
Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal, Que.

CUT GEARS

Rawhide — Steel — Brass — Cast
Iron

Try our W-G Rawhide Silent Gear. Designers and Builders of Special Machinery.

Winnipeg Gear & Engineering Co.
197-199 Princess St., Winnipeg, Man.



**Do you want someone to
handle your small
stamping work?**

An advertisement in this section will put you in touch with firms who have the facilities for handling small stampings, small tools, jigs, fixtures, etc. If you need their help, tell them so here.

CANADIAN MACHINERY

Contract Work Section

143 UNIVERSITY AVENUE

TORONTO

GAUGES AND TOOLS

OUR SPECIALTY

How is This?

No. 28 THREAD GAUGE FOR NOSE OF SHELL

ONLY \$35.00

CAN DELIVER FROM STOCK.

THE MONARCH BRASS MFG. COMPANY, LIMITED

71 Browns Ave., Toronto

Mention this paper when writing advertisers. It will identify the proposition about which you require information.

WHY TOLERATE

TROUBLE

in **YOUR Grinding Department?**

Eliminate all difficulties by using High-Grade Selected

DIAMONDS

Direct from the South African Diamond Fields. All sizes at your command, either unmounted or mounted in any style holder, **MADE IN CANADA.**

Try our **CAST STEEL** mounting for complete satisfaction of performance.

Wheel Trueing Tool Company

88 West Pitt Street

WINDSOR, ONTARIO

Advertisell It!

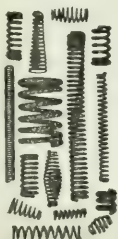
If you have Machinery which your plant has outgrown—advertisell it.
Or if you have a Factory Building which you have outgrown—advertisell it.
That is, advertise it in our Classified Advertising Section and **SELL** what you have for sale.

CANADIAN MACHINERY

CLASSIFIED ADVERTISING SECTION

143-153 UNIVERSITY AVENUE

TORONTO, CANADA

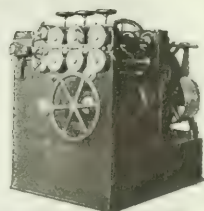


The Machines that put the "Rings" in Springs!

More Than Forty Standard Spring Making Machines.

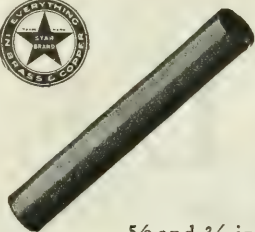
High-Speed Automatics for Making Fuse
and Small Arms Springs.

Flexible Metallic Tube and Casing Coilers.



Sleeper & Hartley, Inc., WORCESTER, MASS. and COATICOOK, P.Q.

If any advertisement interests you, tear it out now and place with letters to be answered.



IN STOCK READY TO SHIP "STAR BRAND" SEAMLESS BRASS CONDENSER TUBES

TINNED INSIDE AND OUTSIDE

$\frac{5}{8}$ and $\frac{3}{4}$ inch O.D., No. 18 Stubs Gauge—12, 14, 16, 18 and 20 foot lengths

—AND—

"STAR BRAND" BRASS CONDENSER TUBE FERRULES

Standard 14 Thread for $\frac{5}{8}$ and $\frac{3}{4}$ in. Tubes

OUR STOCK ON HAND READY FOR IMMEDIATE SHIPMENT ALSO INCLUDES A FULL LINE OF REGULAR STOCK SIZES AND SHAPES OF THE FOLLOWING

"STAR BRAND" SPECIALTIES

Seamless Brass and Copper Pipe and Tubing, Brass Fittings, Sheet Copper, Copper Bar, Rods and Wire, Copper Nails, Sheet Brass, Brass Rods, Tobin Bronze Rods, Copper Rivets and Burs AND OTHER PRODUCTS IN BRASS, COPPER, PHOSPHOR BRONZE, ARCHITECTURAL BRONZE, ETC., ETC.

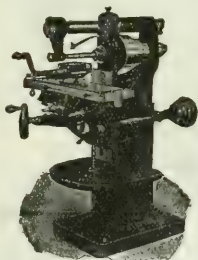
U. T. HUNGERFORD BRASS & COPPER CO.

BRANCHES:
BOSTON
BALTIMORE
PHILADELPHIA
SAN FRANCISCO

HUNGERFORD BUILDING
Lafayette, White and Franklin Sts.
NEW YORK, U.S.A.

KINDLY ADDRESS
INQUIRIES
FOR ATTENTION OF
DEPARTMENT D.

Don't Crowd Your Large Machines



You cannot manufacture small parts economically on a large machine. Steptoe Small Power Feed Millers and Hand Millers are especially adapted for that kind of work, a stiff, heavy tool that can be quickly handled and crowded to the limit. That is the machine to buy for small parts.

If your Planers are crowded take the small jobs and put them on a Steptoe Shaper and you will do them quicker and you will have less money invested in equipment.

STEPTOE SHAPERS "Just a Little Better."

CIRCULAR ON REQUEST.



John Steptoe Co., Cumminsville, Cincinnati, Ohio, U.S.A.



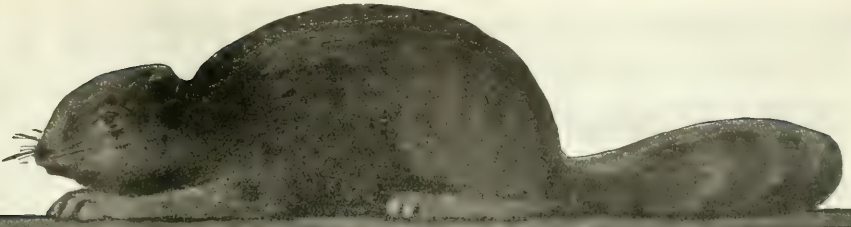
Did you ever notice somebody starting a conversation in a low voice with the two words "They say"? The moment you hear it you know it is gossip, scandal, and most likely a lie. But when you hear everyone saying that HARRIS HEAVY PRESSURE is the best BABBITT METAL they can use for all general machinery bearings, isn't it about time to believe them?

Send to our nearest factory for a trial box.

Manufactured and guaranteed by

The Canada Metal Company, Limited

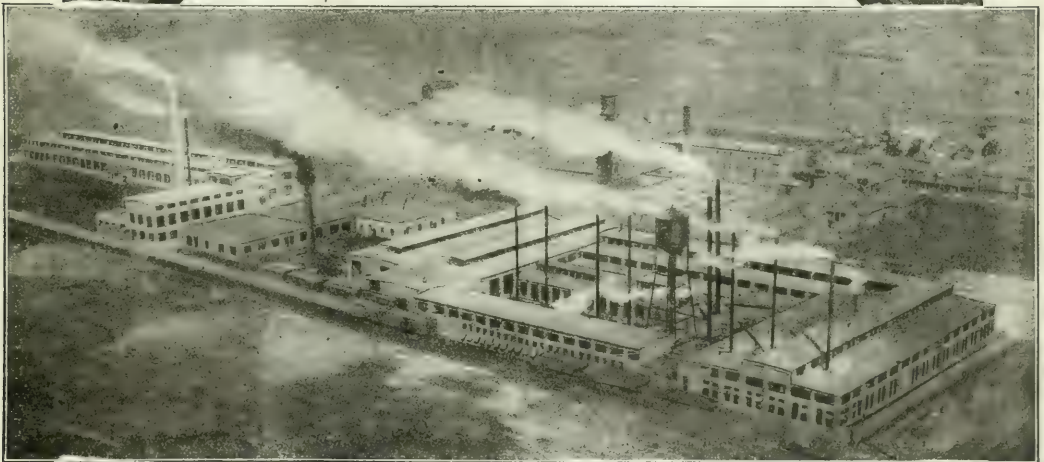
Hamilton Montreal TORONTO Winnipeg Vancouver



BROWN'S

BEAVER BRAND METALS

BRASS, BRONZE,
CANADA SILVER and GILDING METAL
In Sheets, Rolls, Plates and Rods

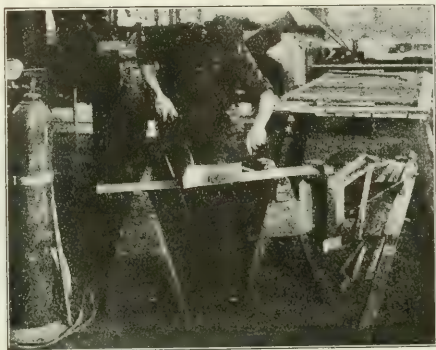


**Brown's Copper & Brass Rolling
Mills, Limited**

General Offices and Works:
New Toronto, Ontario, Canada



Oxy-Acetylene Welding and Cutting



Welding two pieces of angle iron by the Prest-O-Lite Process

Sometimes the Only Way-- Generally the Best Way-- Always a Possible Way.

Wherever two pieces of metal are to be joined, the Prest-O-Lite Process of Oxy-Acetylene Welding provides a simple, low-cost method. It opens the way to metal manufacturing, construction and repair operations which cannot be performed by any other process.

In practically every metal manufacturing industry oxy-acetylene welding is providing better, neater-appearing and more lasting joints than have been hitherto obtainable by riveting, threading or other methods, and at the same time is lowering production costs. Operations on metal parts, large and small, are handled easily, quickly and economically by this process. Welded joints can be built up to give added strength if desired. The metal is left in satisfactory condition for subsequent machining. For repair work it more than pays its way—preventing costly delays and replacements—handling the jobs "right on the spot" with efficiency and dispatch.

Prest-O-Lite **PROCESS**

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready-made carbide gas) is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones. Provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment. Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

This Welding outfit is portable, and handy for use inside or outside the shop. The Prest-O-Lite system of exchanging your empty cylinders for full ones insures perpetual service.

Write for valuable illustrated literature and data on work others are doing by the Prest-O-Lite Welding Process. It may point out ways to solve your problems. Address Dept. C-107.

THE PREST-O-LITE COMPANY, INC.

CANADIAN GENERAL OFFICES: 93-14 C.P.R. Building TORONTO

Direct Factory Branches: Toronto, Ont.; Montreal, Que.;
Merriton, Ont.; Winnipeg, Man.

Canadian Plants: Toronto, Ont.; Merriton, Ont.; Winnipeg, Man.; Shawinigan Falls, Que. (under construction.)

World's Largest Makers of Dissolved Acetylene

PROVIDE A MAN WITH GOOD TOOLS

and you will get good results.

In files---give him one or other of the "Famous Five."

They are hard and sharp
---consequently the mechanic does good work with the minimum of labour.

And that's a desirable result for all concerned.

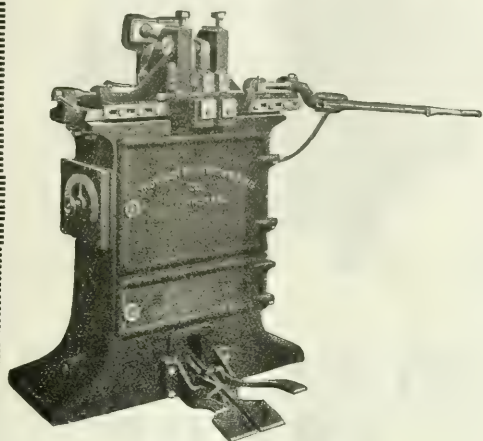
Specify "Famous Five" when ordering.

They are:



Thomson Process
Electric Welding

Thomsons Weld Practically Anything

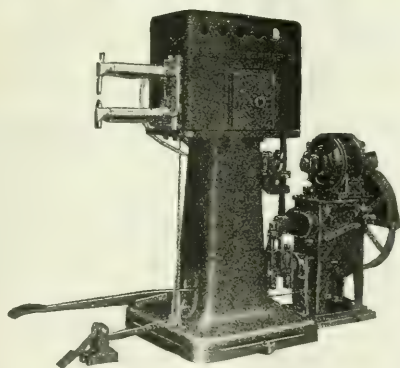


That does seem rather broad—but in reality it isn't. There may be a few metals that won't electric weld—but they are so rare that they aren't commonly used. Such metals as iron, steel, copper, brass, etc., are easy for the Thomson Butt Welder.

Sheets, tubes, bars, pipes, heavy or light work, are all electro-welded by simply pulling a lever.

Send for Bulletin B-4.

We Guarantee Savings With A Thomson Spot Welder



If you have riveting or soldering to do in your plant we will guarantee to save you money by using the Thomson Spot Welder. How could you help saving money — no rivets or solder to buy, no holes to punch, 60 to 90% faster, 60% stronger—you can't help but save a goodly amount and increase your production in the bargain.

Our corps of experts to aid you in selecting the correct machine for your work are at your command.

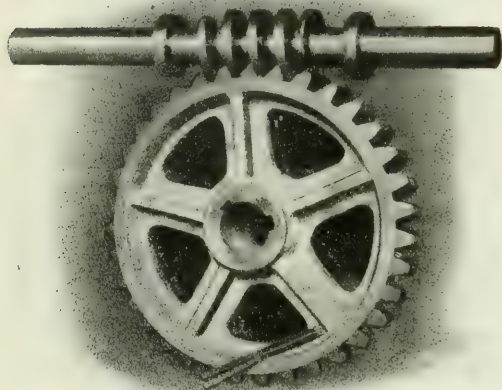
Send for Bulletin S-4.

Thomson Electric Welding Co. Thomson Spot Welder Company
Lynn, Mass.

Canadian Sales Offices, 311 Falls Street, Niagara Falls, N.Y.



CUT GEARS



Standard or Special Gears
in quantity or singly—
Whatever your requirements
We can serve you well.

Write us for quotations.

Hamilton Gear & Machine Co.

Van Horne Street

-

TORONTO

The Labor Saver



Showing
Truck
in
Elevated
Position

THIS ELEVATING TRUCK greatly reduces cost of producing SHELLS

or any factory product where numerous
operations are required.

All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed, and with it the loaded platform, at the same time automatically locking it in its raised position.

When hauled to the desired position the button is pressed and the handle raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform.

Raising and lowering of the truck can be operated with one hand—can be raised or lowered at any angle. Specially designed ball-bearings throughout.

We also manufacture Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and PRESSES WITH ATTACHMENTS FOR PRESSING IN BAND—fixtures especially adapted for the manufacture of 18-pr. Shrapnel Shells.

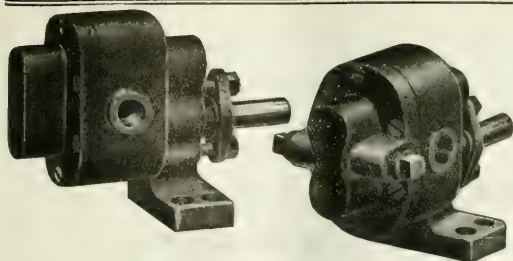
You will profit by getting in touch with us now for prices and full information.

**THE CHAPMAN DOUBLE BALL
BEARING CO. OF CANADA
LIMITED**

339-351 Sorauren Ave. - TORONTO, CANADA

TRANSMISSION BALL BEARING CO., INC.

1050 Military Road, Buffalo, N.Y.



Circulating Pumps

Eliminate the separate relief valve and its necessary piping by installing the Roper Circulating Oil Pump. But, you say, why install a new system when the present is good enough? This "good enough" article may appear to be giving satisfaction, *but*, is it giving the best to be obtained. Can you speed up without any fear? With a Roper you need not have any fear of any kind. The oil flows from it in a steady, even stream, and there you can speed up to full capacity and let her go feeling confident.

Inquire. You will get valuable information anyway.

C. F. ROPER & CO.

Hopedale : Mass. : U.S.A.

The Spiro Never Slips



The Spiro Compression Coupling is locked to the shaft by a graduated grip.

The pull of the bolts on the two halves of the coupling acts on the spiral slotted sleeve until it grips the full surface of the shaft with a never-slip hold.

Every bolt pulls, and at every pull the grip grows.

And last, but not least, the Spiro can be removed as quickly and easily as it can be applied.

The Bond Booklet describes our complete line of Power Transmission Devices.

Canadian Bond Hanger & Coupling Company, Limited

Alexandria

Ontario

Cutting Iron and Steel by Oxy-Acetylene Process

Every "A.L.S." Oxy-Acetylene Welding Outfit is, by the addition of an "A.L.S." Cutting Torch, a complete cutting unit. Iron and Steel up to several inches in thickness may be cut with less labor, in less time and at less expense than by the old methods.

THIS MEANS GETTING MORE DONE FOR LESS MONEY

Cutting 8 discs, 10 $\frac{1}{8}$ " in diameter out of steel $\frac{7}{8}$ " in thickness in 50 minutes by an "A.L.S." Cutting apparatus. Material had a heavy coating of rust on it, having been taken off the scrap heap. 56 cu. ft. of gas used.

Oxy-Acetylene Process saves Money, however used.

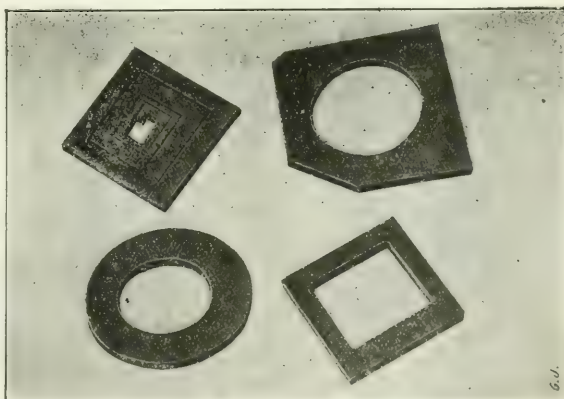
You have an application for the process and it means the saving of time, money and material. Why not write to-day and let us prove it to you. No obligation.

L'Air Liquide Society

Pioneers of the Process

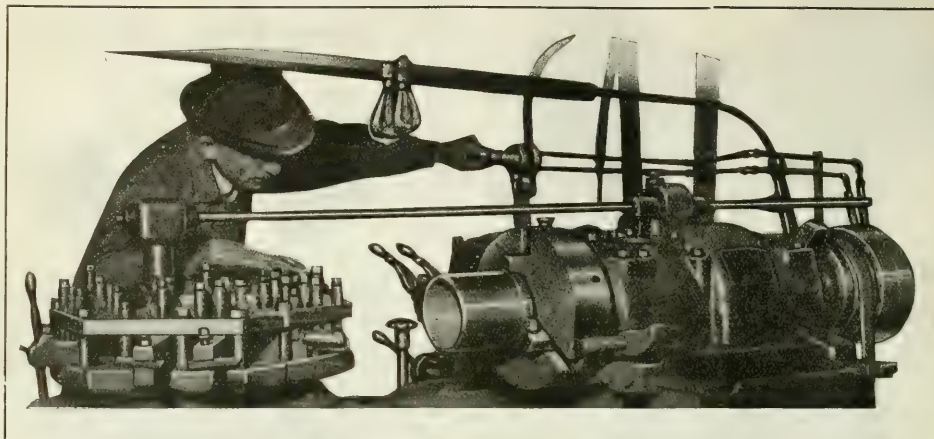
Factories the world over

Montreal - Cor. 1st. Ave. and Ernest
Toronto - - - - 16 Boler St.
Winnipeg - - - - 1297 Pine St.
Halifax - Factory under construction



Examples of Cutting by an "A. L. S." Oxy-Cutter.

If any advertisement interests you, tear it out now and place with letters to be answered.



What Is Your Opinion of Air Chucks?

After demonstrating their labor and time-saving features a Canadian firm adopted the Hannifin Air Chucks on their line of lathes. Many Canadian firms where female labor is prevalent have installed the Hannifin Air Chucks because of those same two features—labor and time-saving.

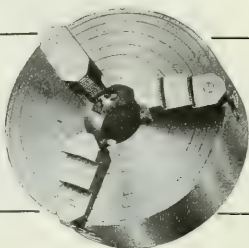
Your needs are those which we wish to fulfill. Your present chucks may be "good enough." Is "good enough" sufficient? Let us send you information and data that will establish in your estimation the superiority of the Hannifin Air Chucks. Wherever records in shell operating have been found you will find Hannifin on that "front." They are in the foreground always.

When writing ask for our catalogue showing our mandrels, countershafts, vises, arbor presses, chucks,—all air operated.

Hannifin Manufacturing Company

Chicago, Illinois, U.S.A.

Representatives: The Canadian Fairbanks-Morse Co., Montreal. European Representatives: Coats Machine Tool Co., London; Fenwick, Freres & Co., Paris; Ignosskoff & Co., Petrograd.



Representatives: R. E. Ellis Engineering Co., Chicago; Coats Machine Tool Co., New York City; A. R. Williams Machinery Co., Toronto; Williams & Wilson, Montreal.

Jacobs

IMPROVED

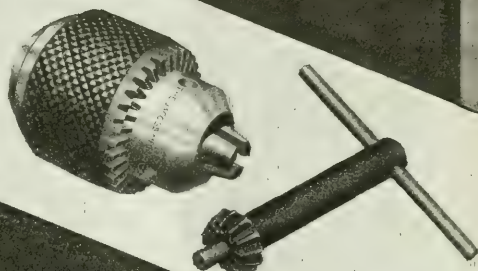
Drill Chuck

A Winner By Sheer Merit

Jacobs Improved Drill Chucks are recognized as the STANDARD the world over. Once tried—always used.

Try them and see for yourself.

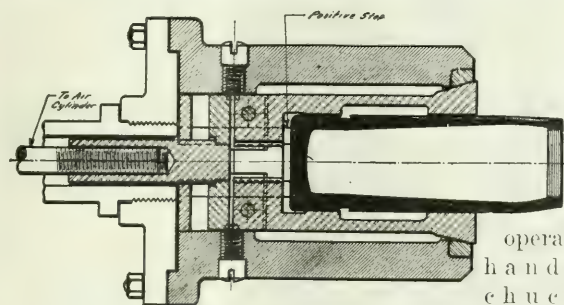
MADE BY
The Jacobs
Manufacturing Co.
Hartford, Conn., U.S.A.



Consider the Saving!

When you stop to consider the fact that M.E.C. air-operated Hinged Collets assure 90% faster

operation than
hand power
chucks and



spring collets, you will realize why they are preferred by the shrewd manufacturer.

They are so accurate, reliable and satisfactory that you can draw up your own guarantee. Is not this positive proof of their superiority?

Ask for full particulars about this and other M.E.C. Labor Saving Devices—Air Cylinders, Air-operated Expanding Mandrels, Collapsible Taps, etc.

Manufacturers Equipment Co.

171 N. JEFFERSON ST.

CHICAGO, U. S. A.

Agents for Central and Eastern States and Canada—J. R. Stone
Tool and Supply Co., Goebel Bldg., Detroit, Mich.

Foreign Agents: C. W. Burton, Griffiths & Co.,
Ludgate Square, Ludgate Hill, London, Eng.

LABOR SAVING DEVICES



Gentlemen:

Please send me copy
of your catalog entitled "Labor
Saving Devices," according to your
advertisement in Canadian Machinery.

Name
Address
Position
With

If any advertisement interests you, tear it out now and place with letters to be answered.



Murchey

EQUALS 10 SOLID TAP LIVES

That point alone is sufficient to stamp Murchey adjustable taps as the undisputed leader of its class.

The point is this: when a chaser on a Murchey Tap is ground it can be adjusted to compensate for wear; with a solid tap this cannot be done with the fineness, the finish, the absolute accuracy that characterizes our adjustable taps. A solid tap will lose its accuracy, and the more grindings the greater the inaccuracy. We maintain a special chaser service for our clients.

The Murchey Adjustable Tap has other features which we will gladly furnish upon request.

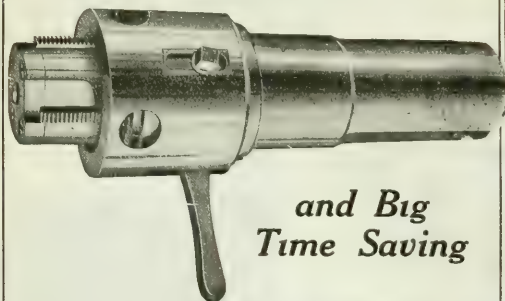
MURCHEY MACHINE & TOOL CO.

75 Porter St.

Detroit, Mich.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
Fenwick Freres & Co. 16 Rue Fenelon Paris, France

For Positive Accuracy—

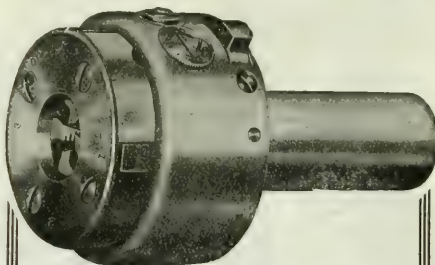


*and Big
Time Saving*

"Victor" Collapsible Taps are simple in construction; the few parts can be made large and strong; the body is machine steel, and the chasers are high-speed; screw adjustment from front end makes it easy to maintain close accuracy; trip is automatic; reset by means of lever. The above features—and others—make the "Victor" a time and money saver for severe service. It is being used by many shell manufacturers.

VICTOR Collapsible TAPS

Victor Tool Company
Waynesboro, Pa., U.S.A.



THREE FEATURES

Self-opening. Cut right up to a shoulder. The chasers. These features work together and by so doing make a die head that is unbeatable. The chasers are held in position by a cam, which locks when adjusted. They can be released from the thread at any given point.

You can speed up to the maximum with an "H & G" and stay there.

An inquiry will command our immediate attention.

Eastern Machine Screw Corp.

New Haven Conn. U.S.A.

H & G

Every Butterfield Tap comes to you ready for long, hard service.

It is made by expert workmen—from the finest materials obtainable—and thoroughly tested before shipment.

For the tap that is uniformly dependable in service — specify Butterfield.

Butterfield & Co., Inc.

Rock Island

::

Quebec

Toronto Office:

1505 Traders Bank Building

Phone Main 1382

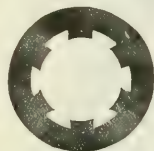
H. A. Harrison, Manager.

Catalog No. 14 containing the complete list of Butterfield Tools awaits your request.

BUTTERFIELD

If any advertisement interests you, tear it out now and place with letters to be answered.

HINTS TO BUYERS



Eliminate Danger

Accidents break down the efficiency of your organization, lead to legal troubles, loss of time and money.

TRADE MARK

BRISTO

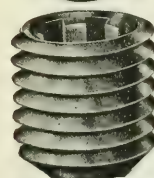
REG. U. S. PAT. OFFICE

SAFETY SET SCREWS

Insure safety. They also protect themselves because of their patented construction. The dove-tailed design of wrench and screw contracts the metal under pressure. The harder you twist the wrench the more the metal of the screw is compressed.

Write for BULLETIN 1-809

THE BRISTOL COMPANY
Waterbury, Conn., U.S.A.



THOUSANDS of Dollars are saved every year by our clients, because we have experts who are trained to make exhaustive tests of all the material you are purchasing, whether raw material or finished products.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED

Head Office and Main Laboratories—MONTREAL

Branch Offices and Laboratories:

TORONTO, WINNIPEG, EDMONTON, VANCOUVER,
NEW GLASGOW.

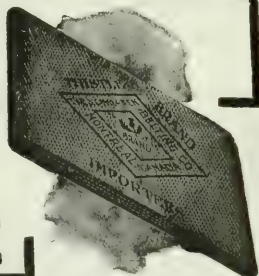
"THISTLE" BRAND RUBBER BELTING

"Maintenance of Quality"

is our motto, and our experience in the manufacture of belting since the year 1856 should be invaluable to you. Let us tell you all about this friction faced belting. The price will appeal to you.

Write to-day.

J. C. McLAREN BELTING CO., LTD.
TORONTO, MONTREAL, WINNIPEG



STEEL CASTINGS

We are well equipped to make all kinds of steel castings, 100 lbs. to 50,000 lbs.

Dominion Steel Foundry Co.

Hamilton

LIMITED

Ontario

IS YOUR RIVETING PROFITABLY DONE?

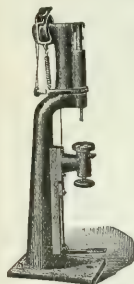
Our Elastic Rotary Blow Riveting Machine does profitable work, because one machine will do the work of several hand riveters, and do it better.

Every head is perfectly formed, any shape, round, flat, oval, rectangular, etc.

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Also makers of Wire Straighteners and Cutter,
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Electric Cranes
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NORTHERN CRANES

CRANES
MADE IN
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Electric Hoists
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CHUCKS

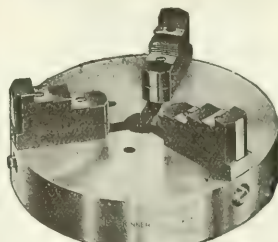
Universal Geared
Scroll Type with
either one or two
sets Jaws.

Richmond Mfg. Co., Ltd.

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Skinner Universal Chuck



Geared Screw Type
Has a stronger grip-
ping power than any
similar chuck made.
For extremely accurate
work this chuck has
no equal. It is made
also in the Combination
pattern with three
or four jaws.
Printed matter sup-
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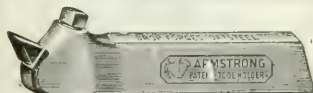
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MAKE GOOD

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Special facilities for Keyseating up to 6 in. diameter.

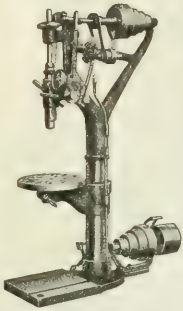
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THE ULTIMATE
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Give Excellent
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They cut straighter.
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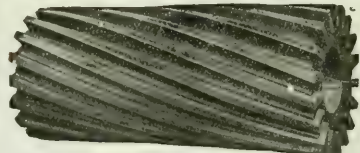
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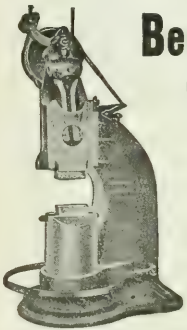
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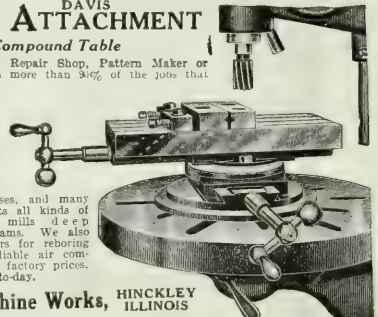
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For the Die Maker, Repair Shop, Pattern Maker or
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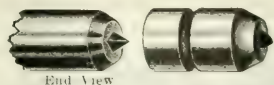
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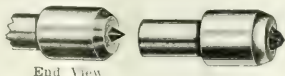
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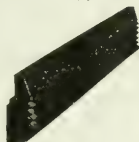
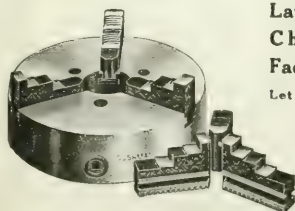
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Leatherette covered. Solid
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drawer slides. Felt lined
throughout. A real tool chest
to meet your particular require-
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you know immediately if one is mislaid or borrowed. **Write**
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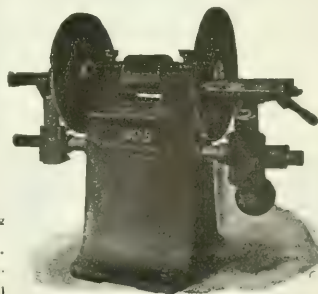
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and combinations.
We can success-
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"Frost King" *An International Favorite*

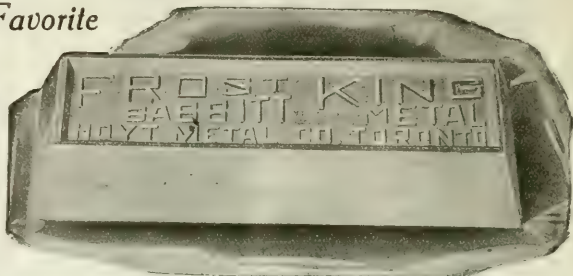
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The Diamo-Carbo Emery
Wheel Dressers

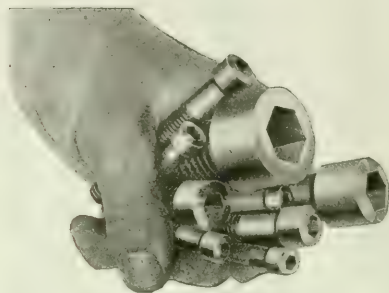
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We can make prompt deliveries of any type of Dresser desired.

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Socket Head Cap Screws

Meet all the requirements of machine tool builders who need a stronger and better screw than the slotted fillister, hexagon head or square head cap screw. Can be set up hard and loosened without marring the heads. Are threaded accurately to standard gauges and perfect in lead. Heads turned true with body, very convenient in close corners and greatly improves the appearance of any machine. Write for circular and free samples.

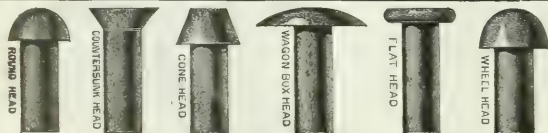
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Rocleston Machine & Tool Co., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Stow Mfg. Co., Binghamton, N.Y.

BORING MACHINES, STOVE AND COAL

Cunningham & Son, J. W., New Glasgow, Canada

BORING AND TURNING MILLS

John Bertram & Sons Co., Dundas
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal
Niles-Bement-Pond Co., New York
H. W. Petrie, Ltd., Montreal
H. W. Petrie, Toronto
R. E. T. Pringle, Ltd., Toronto, Ont.

BOXES, STEEL SHOP AND TOTE

Cleveland Wire Spring Co., Cleveland

BRASS AND COPPER BARS, RODS AND SHEETS

Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Wks., Ltd., Chatham, Ont.

BRASS AND COPPER BARS, RODS AND SHEETS

Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Wks., Ltd., Chatham, Ont.

BRASS WORKING

Hungerford Brass & Copper Co., U. T. N.Y.

BRIDGES, RAILWAY AND HIGHWAY

The Jencks Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes & Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS

Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Wks., Ltd., Chatham, Ont.

BUFFERS

Secord's Dunking Fountain Co., Haxby, Mass.

BUFFING AND POLISHING MACHINERY

Food-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal
R. E. T. Pringle, Ltd., Toronto, Ont.

BUCKETS, CLAM SHELL, CRAB, DUMP
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BUCKETS, ELEVATING AND HOISTING
Randall, Edith A., Toronto.

BULLDOZERS
John Bertram & Sons Co., Dundas.
E. W. Petrie & Co., Brockton, N.Y.
Canada Machinery Corp., Galt, Ont.

BURNERS, OIL AND NATURAL GAS
Bellevue Industrial Furnace Co., Detroit, Mich.
Gray Mfg. & Co., Toronto, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Oven Equipment & Mfg. Co., New Haven, Conn.

BURNING REAMERS
F. C. Bess, Co. of Canada, Galt, Ont.

BURRS, IRON AND COPPER
Hungerford Brass & Copper Co., New York, N.Y.
Tanner & Bullock Co., Gananoque.

BUTTERISERS
Wells Bros. Co. of Canada, Galt, Ont.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Prest-O-Lite Co., Inc., Toronto, Ont.

CARS, INDUSTRIAL
Corbett Pk. & Mach. Co., Ltd., Owen Sound.
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Marsh & Heath in Belleville, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CAR MOVERS
Dillon Mfg. Co., Oshawa, Ont.

CARTRIDGE MAKING MACHINERY
Blackall, Fred, St., Woodworth Tower, New York.
Prest-O-Lite Co., Inc., Toronto, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER
Cumming & Son, J. W., New Glasgow, Canada.
Alexander Fleck, Ltd., Ottawa.
Hungerford Brass & Copper Co., New York, N.Y.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Tallman Brass & Metal Co., Hamilton.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Forterville, Que.
Brown, Boggs & Co., Hamilton, Canada.
Can. Steel Foundries, Ltd., Montreal, Que.
Alexander Fleck, Ltd., Ottawa.
Gardner, Robt. & Son, Montreal.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Plessisville Foundry Co., Plessisville, Que.
Shelds, Limited, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Can. Steel Foundries, Ltd., Montreal, Que.
Canadian Steel Foundry Co., Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
Can. Steel Foundries, Ltd., Montreal, Que.
Cumming & Son, J. W., New Glasgow, Canada.

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que.
CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt. & Son, Montreal.
H. W. Petrie, Toronto.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Wells Brothers Co., Greenfield, Mass.
John Bertram & Sons Co., Dundas.
Gardner, Robt. & Son, Montreal.
Hurlbut, Rogers Mach. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Foss & Hill Mach. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Leman Tube & Supply Co., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

CHEMISTS
Can. Inspection & Testing Lab., Montreal, Que.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Toronto Testing Laboratory, Ltd., Toronto.

CHISTS, TOOL
Union Tool Chest Works, Rochester, N.Y.

CHUCKS, AERO, AUTOMATIC
Garrin Machine Co., New York.
Harrington Mfg. Co., Chicago, Ill.
Hyde Engineering Works, Montreal.

CHUCKS, AIR
Manufacturers Equipment Co., Chicago, Ill.

CHUCKS, COLLET
Harrington Mfg. Co., Chicago, Ill.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss & Hill Mach. Co., Montreal.
Gardner, Robt. & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Harrington Mfg. Co., Chicago, Ill.
Harrington Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Hawthorn & Gwynne, Bradford.

CHUCKS, RING WHEEL
Fort-Sumner Machine Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, SPLIT
Rivett Lathe & Grinder Co., Brighton, Mass.

CHUCKING MACHINES
424244 Machine Co., New York.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Robtson Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.

CLOCKS, WATCHMAN, PORTABLE
Harrington Bros., Chicago, Ill.

CUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Forterville, Que.
Johnson Machine Co., Carlyle, Manchester, Conn.
Hutchinson & Phipps, Ltd., Toronto.

Millers Falls Co., Millers Falls, Mass.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Richmond Mfg. Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.
R. W. Randall, Toronto.
Skinner Chuck Co., New Britain, Conn.
Thomas Elevator Co., Chicago, Ill.
D. E. Whitton Machine Co., London, Conn.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Corbett Pk. & Mach. Co., Ltd., Owen Sound.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.
Richmond Mfg. Co., Toronto, Ont.

CHUCKS, FRICION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, GEARED SCROLL
Richmond Mfg. Co., Toronto, Ont.

CHUCKS, MAGNETIC
H. E. Streeter, 225 New Boks Bldg., Montreal.

CHUCKS, RING WHEEL
Fort-Sumner Machine Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, SPLIT
Rivett Lathe & Grinder Co., Brighton, Mass.

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424244 Machine Co., New York.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Robtson Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.

CLOCKS, WATCHMAN, PORTABLE
Harrington Bros., Chicago, Ill.

CUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Forterville, Que.
Johnson Machine Co., Carlyle, Manchester, Conn.
Hutchinson & Phipps, Ltd., Toronto.

COAL HANDLING MACHINERY
MacKinnon, Holmes & Co., Sherbrooke, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Echting Foundry Equipment Co., Harvey, Ill.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Zenith Steel & Coal Products, Montreal, Que.

COLLARS
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.

COLLETS
Rivett Lathe & Grinder Co., Brighton, Mass.
A. E. Williams Mach. Co., Toronto.

COMPRESSORS, AIR
Chemical Mach. Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Mach. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinchley Machine Co., Hinchley, Ill.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

CONDENSER TUBES AND FERRULES, BRASS
Hungerford Brass & Copper Co., New York, N.Y.

CONTROLLERS AND STARTERS, ELECTRIC MOTORS
Dominion Mach. Co., Toronto, Ont.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Foster Machine Co., Elkhart, Ind.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co., Harvey, Ill.

COPING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
John Bertram & Sons Co., Dundas.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

COUNTERSHAFTS
Baird Machine Co., Bridgeport, Conn.
Foster Machine Co., Elkhart, Ind.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Forterville, Que.

COUPLINGS, PLAIN AND FLEXIBLE
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt. & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.

CRANES, LOCOMOTIVE
Northern Crane Works, Walkerville.

CRANES, GENTRY
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND
Curtis Pneumatic Mach. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Heppner, John T., Ltd., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRUMPLERS, LEATHER
Gaston & Knight Mfg. Co., Worcester, Mass.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.

CUPOL, BROTHER GAUGES & BLOWERS
Sheldons, Ltd., Galt, Ont.

CUTTER GRINDERS AND ATTACHMENTS
Cincinnati Milling Machine Co., Cincinnati.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Monarch Brass Mfg. Co., Toronto, Ont.
Norton Grinding Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto

CUTTERS, PIPE (SEE PIPE CUTTERS)
Bicker Milling Machine Co., Boston, Mass.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Milling Mach. Co., Cleveland, Ohio.
Cleveland Twist Drill Co., Cleveland, Ohio.
Dommon Mach. Co., Toronto, Ont.
Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Godard Tool Co., Chicago, Ill.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mach. Co., New Bedford.

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Canadian Fairbanks-Morse Co., Ltd., Montreal.
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Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Milling Mach. Co., Cleveland, Ohio.
Cleveland Twist Drill Co., Cleveland, Ohio.
Dommon Mach. Co., Toronto, Ont.
Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Godard Tool Co., Chicago, Ill.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mach. Co., New Bedford.

CUTTERS, MILLING
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Foss & Hill Machinery Co., Montreal.
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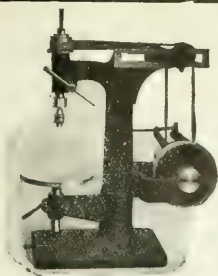
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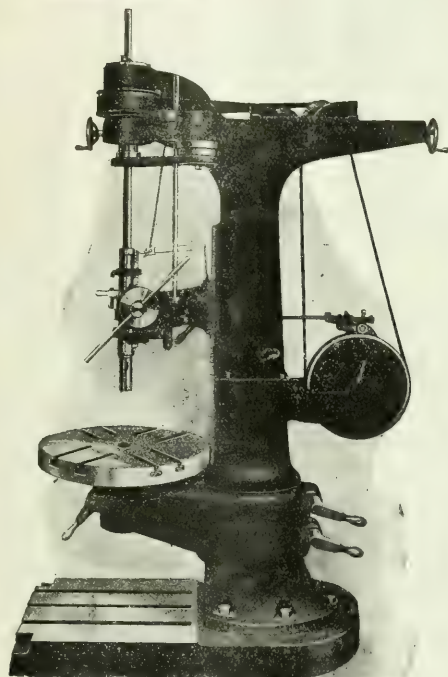
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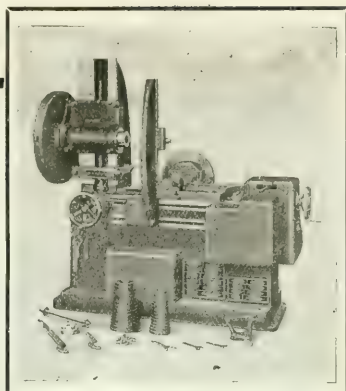
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Rapid as Well as Accurate Spacing of Gear Teeth

made possible by the positive, no-shock, independent action of the indexing mechanism of Brown & Sharpe Gear Cutting Machines.

Appreciating the need for speed as well as precision, the man responsible for the gear production of a busy shop is bound to be impressed by this feature of B. & S. Machines. He sees wherein

Accuracy is assured by:

The precision-cut teeth of the index wheel which is large in proportion to the gear being cut, and the positive action of the indexing mechanism, which is accelerated at the start and retarded at the end of each indexing period to eliminate shocks at any stage of the movement.

And a High Production Rate because:

The indexing mechanism acts independently of feed and speed of cutter, resulting in a constant high speed in indexing, regardless of feed and speed of cutter.

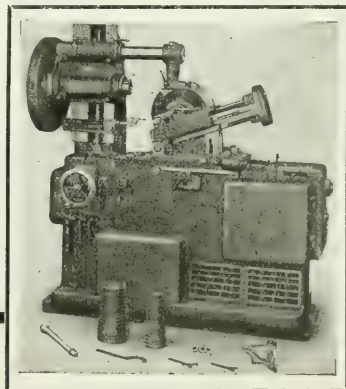
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SPUR AND BEVEL GEAR-CUTTING MACHINE



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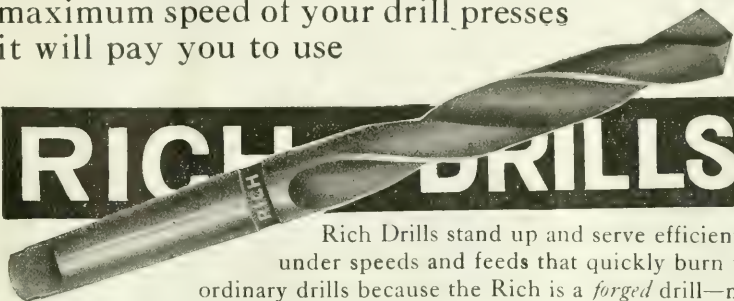
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To Drive Your High-Speed Drills

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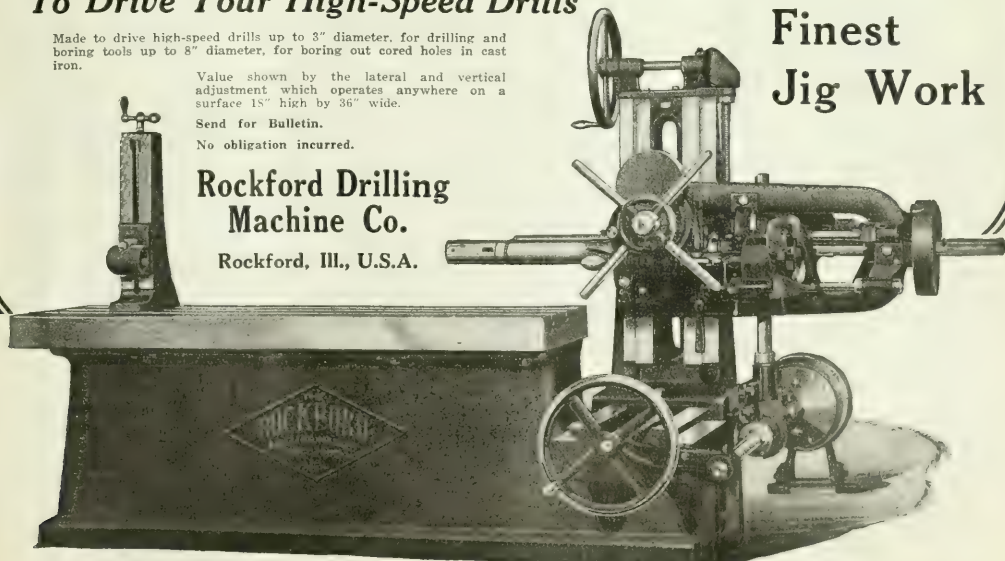
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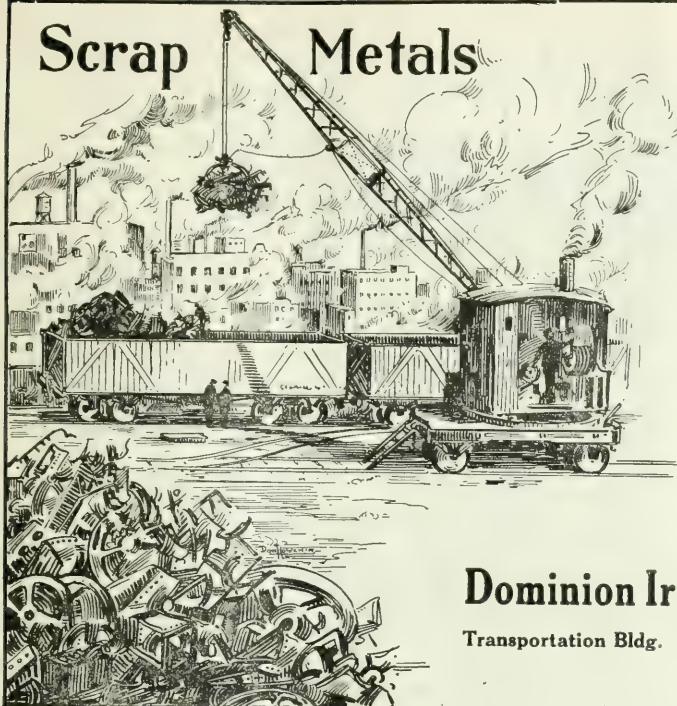
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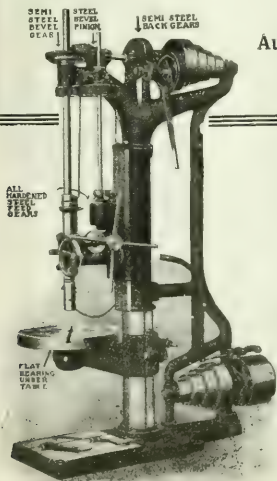
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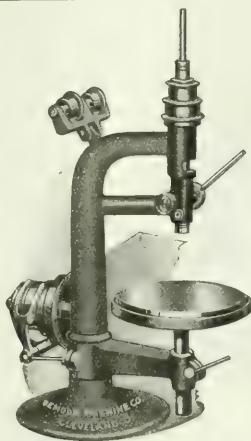
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Marsh & Henthorn, Belleville, Ont.

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Garvin Machine Co., New York.

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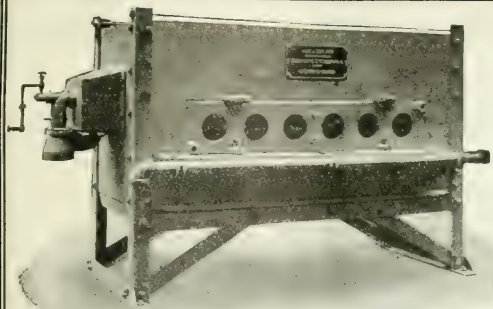
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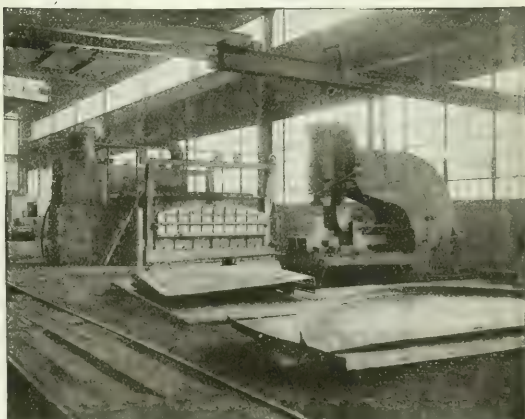


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Wells Bros. Co. of Canada, Galt, Ont.

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Pratt & Whitney Co., Dundas, Ont.
Sheddons, Ltd., Galt, Ont.
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W. H. Bandfield & Sons, Toronto.
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John Bertram & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.

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PUNCHING MACHINES, VERTICAL

John Bertram & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.

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Apparatus
Scaff & Sons Co., Wm. R., Pittsburgh, Pa.

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Jas. Hoskins, Ltd., Walkerville, Ont.

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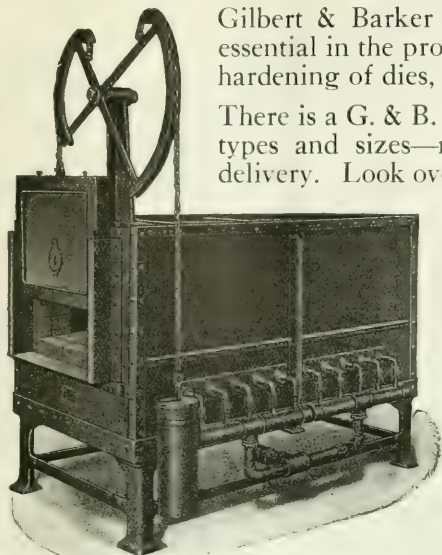
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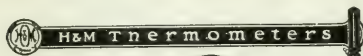
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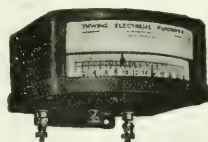
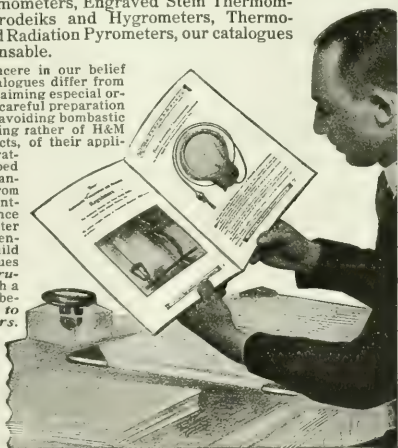
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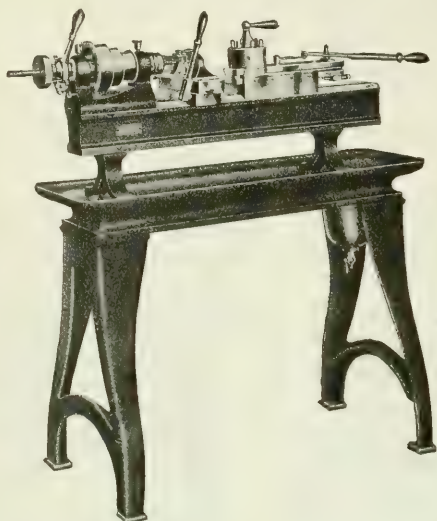
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A weekly newspaper devoted to the machinery and manufacturing interests.

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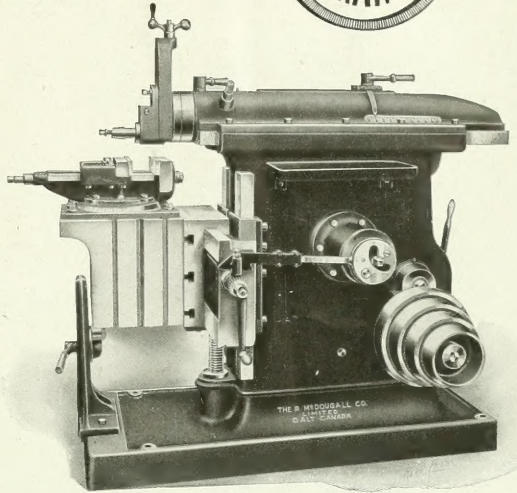
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